GUIDANCE FOR IMPLEMENTATION OF EMISSION MONITORING REQUIREMENTS FOR THE NO_x BUDGET PROGRAM

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Ozone Transport Commission
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Introduction

On September 27, 1994 the Ozone Transport Commission (OTC) adopted a Memorandum of Understanding (MOU) committing the signatory States to the development and proposal of a region-wide nitrogen oxides (NO_x) emission reduction in 1999 and 2003[1]. The OTC MOU requires reductions in ozone season NO_x emissions from utility and large industrial combustion facilities, in order to further the effort to achieve the health-based National Ambient Air Quality Standard (NAAQS) for ozone.

In January, 1996 the OTC released the NO_x Budget Model Rule to provide State regulatory agencies a common framework for the promulgation of State regulations. The model rule reflects a consensus among the States and U.S. E.P.A. on key regulatory elements of a NO_x Budget Program that implements the OTC MOU. Sections 11 - 13 of the Model Rule outline emissions monitoring, recordkeeping and reporting requirements for NO_x budget sources. Owners and operators of a NO_x budget source must monitor and report emissions for each affected unit at the source.

This document provides additional technical guidance and clarification on the emissions monitoring, data collection and reporting sections of the Model Rule. For Part 75 units, **Part 1** includes additional requirements for monitoring plans, monitoring in some common stack situations and emissions reporting. For non-Part 75 units, **Part 2** includes a more detailed description of each monitoring methodology, initial certification requirements, ongoing quality assurance and quality control requirements, and addresses the basic recordkeeping and reporting requirements for each monitoring methodology. Detailed instructions on the procedures for monitoring plan submissions and approvals and the reporting of emissions data are available in the ***NO_x Budget Program Monitoring Certification and Reporting Instructions***.[2]

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[1] "Memorandum of Understanding Among the States of the Ozone Transport Commission on Development of a Regional Strategy Concerning the Control of Stationary Source Nitrogen Oxide Emissions", signed September 27, 1994.

[2] A first draft of this document will be available in early 1997.

PART 1: REQUIREMENTS FOR PART 75 UNITS

I. GENERAL REQUIREMENTS

An owner or operator of a unit subject to the provisions of Part 75 shall determine NO_x emission rate and heat input using the same monitoring methodologies used to comply with 40 CFR Part 75. The owner or operator must also meet the following additional requirements:

- Additional monitoring plan requirements (for example, to support additional NO_x mass emission formulas);
- Additional requirements to calculate and report hourly NO_x mass emissions in pounds per hour and NO_x mass emissions in tons per ozone season;
- For units with add-on controls using Appendix E, definition of operating parameters and associated ranges to indicate proper operation of control equipment.

Depending upon the existing monitoring configuration, certain units with common or multiple stacks may have additional monitoring and reporting requirements.

In addition, if EPA has approved a petition that affects either NO_x emission rate monitoring or heat input monitoring, an owner or operator should verify with the State that this petition is also applicable for this program.

II. SPECIFIC REQUIREMENTS FOR NO_x MONITORING

A. Common and Multiple Stack Requirements for CEMS Sources

To determine compliance with NO_x emission rate (lb/mmBtu) under the Acid Rain Program, owners or operators of units associated with a common stack have a number of options including: monitoring emissions separately in the ducts to the stack, submitting a NO_x averaging plan, complying at the stack with the most stringent emission limit applicable to a unit associated with the stack, or using an apportionment method approved by EPA. Owners or operators of units associated with a common stack must assure they meet the Part 75 Acid Rain Program monitoring requirements as well as the following NO_x Budget Program requirements:

(1) When all the units that share a common stack are affected by the NO_x Budget Program, an owner or operator must:

(a) Monitor NO_x emission rate and heat input at the common stack level; or

(b) Monitor NO_x emission rate and heat input at the unit level for all units in the common stack; or

(c) Monitor NO_x emission rate at the common stack level and heat input at the unit level.

(2) When any units that share a common stack are not affected by the NO_x Budget Program, an owner or operator must:

(a) Monitor the affected units individually using allowable methodologies; or

(b) Monitor at the common stack level and

1. Petition the State regulatory agency for approval of a methodology to subtract mass emissions produced by the non-affected units. Any such methodology must be verifiable using quality-assured data reported in EDR format and may not systematically overestimate emissions from the non-affected unit(s); or

2. Account for all emissions monitored at the common stack whether or not they come from an affected unit.

(3) When a unit emits to multiple stacks or ducts and uses CEMS, an owner or operator must meet the following requirements:

(a) If heat input is measured in each multiple stack or duct, an owner or operator must measure the NO_x emission rate at each of the multiple stacks or ducts and calculate and report hourly NO_x mass emissions for each stack or duct.

(b) If heat input is determined at the unit level, an owner or operator may use an hourly NO_x emission rate from CEMS in either stack to calculate unit hourly NO_x mass emissions, if:

! There are no add-on NO_x controls at the unit;

! The unit is not capable of emitting solely through an unmonitored stack (i.e., has no dampers); and

! The NO_x emission rate in either stack or duct is representative of the NO_x emission rate in each stack. The rate is not considered representative if:

-- The measurements vary by more than 10%; or

-- For units with an average annual NO_x emission rate less than 0.40 lb/mmBtu, if measurements vary by more than 0.020 lb/mmBtu.

(c) If an owner or operator determines heat input at the unit level and the unit has a main stack and bypass stack which are only used simultaneously during periods when emissions are being rerouted from the main stack to the bypass stack or vice versa, an owner or operator may:

! Install NO_x CEMS in each stack and use the unit heat input and NO_x emission rate for the stack in use to determine hourly NO_x mass emissions; use the higher NO_x emission rate of the two stacks for all hours in which the bypass stack is in use concurrent with the main stack, or

- Install NO_x CEMS in the main stack only and use the maximum NO_x emission rate and the measured unit heat input to calculate hourly NO_x mass emissions for any hour in which the bypass stack is in use or is in use concurrent with the main stack.

B. Appendix E Requirements for Units with Add-on Controls

For Part 75 oil or gas peaking units using add-on emission controls and Appendix E methodology, an owner or operator must identify representative ranges of operational parameters. The ranges indicate proper operation of the NO_x control equipment. Additionally, an owner or operator must record the control equipment operating parameters during each hour of testing and unit operation. The records of the representative ranges and the recorded hourly parameter values must be maintained on site (or at a location known and accessible to the State regulatory agency if on-site storage is not feasible) in a form suitable for inspection. Retain records for at least three years from the date of each record for data recorded during unit operation and until testing is repeated for information recorded during testing. For any hour of unit operation in which add-on emission controls are not operating within a range specified for those parameters an owner or operator must apply missing data procedures. The parameters should include, but are not limited to, the following:

TABLE 1: NO_x CONTROL EQUIPMENT PARAMETERS

Type of Controls	Parameter
Flue Gas Recirculation	FGR rate
Selective Catalytic Reduction (SCR)	Ammonia injection rate
	Temperature at the inlet gas stream to SCR
Selective Non-catalytic Reduction (SNCR)	Ammonia or urea injection rate
	Temperature at the inlet gas stream to the SNCR
Non-Selective Catalytic Reduction (NSCR)	Natural gas (or other HC) injection rate
Water/steam injection	Water or steam injection rate

III. MONITORING PLAN REQUIREMENTS

A. Additional Monitoring Plan Information

For units subject to the requirements of the Acid Rain Program, the monitoring plan maintained under Part 75 meets some, but not all, of the requirements for the NO_x Budget Program. The NO_x Budget Program imposes additional requirements, including, but not limited to:

- Additional unit definition information
- Additional formulas

- ! Control equipment parameters for Appendix E units with add-on controls
- ! Verification of approved petitions relating to NO_x emission rate and heat input

B. Monitoring Plan Submission Deadlines

The authorized account representative (AAR) or alternative authorized account representative (AAAR) for both new and existing Part 75 NO_x budget units must submit a copy of the complete hardcopy Acid Rain and NO_x Budget Program monitoring plan to the State regulatory agency by the following deadlines:

(1) For all existing Part 75 NO_x budget units submit in the first quarter 1998 quarterly report by July 30, 1998 an electronic monitoring plan containing NO_x Budget Program monitoring plan changes and additions.

(2) For any unit at which an owner or operator must install and certify new monitoring systems, submit a complete monitoring plan 45 days prior to the initiation of certification tests for the new system.

(3) For new units under Part 75 submit NO_x Budget Program information with the Acid Rain Program monitoring plan, no later than three months prior to the projected Acid Rain Program participation date.

IV. CERTIFICATION REQUIREMENTS AND PROCEDURES FOR PART 75 UNITS

A. Pretest Notification Requirements

In addition to the notifications required under Part 75, an AAR or AAAR must meet any additional State notification requirements and any requirements for submittal and/or approval of a test protocol.

B. Testing Requirements for Part 75 Sources

If an owner or operator uses certified monitoring systems under Part 75 to meet the requirements of this program and maintains and operates those monitoring systems according to the requirements of Part 75, it is not necessary to reperform initial certification tests to ensure the accuracy of these components under the NO_x Budget Program. However, an owner or operator must perform formula verifications to demonstrate that the DAHS accurately calculates and reports NO_x mass emissions (lb/hr) based on hourly heat input rate (mmBtu/hr) and NO_x emission rate (lb/mmBtu). If an owner or operator of a Part 75 NO_x budget unit must install and operate additional NO_x or flow systems or fuel flow systems because of stack and unit configurations, an owner or operator must certify these monitoring systems using the procedures in Part 75. These systems must be installed, operating and capable of reporting in EDR format by July 1, 1998; however, successful certification testing must be completed before May 1, 1999.

C. Certification Submission Requirements

For systems previously certified under Part 75, an AAR or AAAR must submit to the State regulatory agency the formula verification results for the NO_x Budget Program calculations and the required certification statements.

V. NO_x BUDGET PROGRAM EMISSIONS REPORTING

A. Quarterly Reports

An owner or operator of a unit subject to the provisions of the Acid Rain Program must comply with Part 75 reporting requirements and additional reporting requirements imposed by the NO_x Budget Program. Detailed instructions and reporting formats for the NO_x Budget Program only are in the ***NO_x Budget Program Monitoring Certification and Reporting Instructions***.

For Part 75 sources, the Part 75 quarterly emissions reports will include the following additional information:

! Additional unit identification information as required by the NO_x Budget Program.

! Hourly NO_x Mass Emissions (lb/hr), based on hourly heat input reported in RT 300 and hourly NO_x emission rate reported in RT 320

! Cumulative Budget Period NO_x Mass Emissions (tons/budget period)

! Additional Monitoring Plan Information Related to the NO_x Budget Program

! Certification Status Information as Required by the NO_x Budget Program

B. Emissions Reporting Deadlines

(1) Reporting Using EDR V1.3

In 1998, an owner or operator of a Part 75 NO_x budget unit may meet the reporting requirements of the NO_x Budget Program by meeting all of the current Part 75 reporting requirements and reporting only the additional unit identification information as required by the NO_x Budget Program (100 and 500 level records). It is not necessary to implement and report using the NO_x Budget Program record types for hourly NO_x mass emissions in 1998.

However, if the unit (or units) have common or multiple stacks and must install additional monitoring systems to meet the requirements of this program, monitoring systems must be installed and hourly operating and data from these monitoring locations must be reported beginning on July 1, 1998 using the applicable EDR V1.3 record types. Please note that provisional certification of these monitoring systems is not required until April 30, 1999.

(2) Reporting Using NO_x Budget Program EDR

In 1999, an owner or operator of a Part 75 NO_x budget unit must meet all of the current Part 75 reporting requirements and any additional reporting requirements of the NO_x Budget Program, including reporting hourly NO_x mass emissions using the applicable NO_x Budget Program EDR.

An owner or operator may elect to report all of the additional information required by the NO_x Budget Program before 1999, using the applicable NO_x Budget Program EDR.

C. **Missing Data Procedures**

Part 75 units must use the applicable missing data procedures specified in Part 75 for NO_x emission rate (in lb/mmBtu), heat input, stack gas volumetric flow rate, oil density, GCV or fuel flow rate.

PART 2: REQUIREMENTS FOR NON-PART 75 UNITS

I. GENERAL MONITORING REQUIREMENTS

A. Requirements for Recording and Reporting Unit Operational Status

An owner or operator must record and report the following information on the hourly operational status of each NO_x budget unit:

- On-line status. A unit is "on-line" during any hour in which fuel is combusted. An owner or operator must record and report operating status or partial hour operation status. A partial hour of operation must be reported in quarter hour increments (e.g., 0.25, 0.50, or 0.75 hours).

- For all units using load-based missing data procedures for CEMS or fuel flow or hourly apportionment based on load, hourly load, expressed either as electrical load in megawatts or as steam load in 1000 lb/hour.

- For units combusting multiple fuels and using fuel-based approaches for NO_x mass emissions reporting, all fuels which are combusted in each hour or partial hour of operation. A partial hour of operation must be reported in quarter hour increments (e.g., 0.25, 0.50, or 0.75 hours).

B. Requirements for NO_x Monitoring

(1) CEMS Requirements

An owner or operator of a non-Part 75 NO_x budget unit must install, certify and operate a NO_x continuous emission monitoring system (CEMS) for any unit meeting any one of the following criteria:

(a) Any unit with a maximum rated heat input capacity of 250 mmBtu/hr or greater which is not a peaking unit as defined in 40 CFR Part 72.2; or

(b) Any unit for which the State operating permit allows for the combustion of any solid fuel; or

(c) Any unit for which an owner or operator is required to or has installed a NO_x CEMS for the purposes of meeting either the requirements of 40 CFR Part 60 or any other State or federal requirement.

A CEMS can serve more than one unit. An owner or operator not subject to a NO_x CEMS requirement may also elect to install and operate NO_x CEMS for any unit.

An owner or operator of a unit using NO_x CEMS must meet the initial certification requirements in Section III, the quality assurance requirements in Section IV, the recertification requirements in Section V, and the reporting requirements in Section VI of this document.

For any NO_x CEMS installed at a unit permitted to combust any solid fuel which includes components which measure one parameter on a "dry" basis and another parameter on a "wet" basis and for which a moisture adjustment must be made to calculate NO_x emission rate or NO_x mass emissions, an owner or operator must install, certify, and maintain a quality-assured moisture system to measure and record hourly moisture. An owner or operator of unit combusting only oil and/or gas with NO_x CEMS installed may elect to document and use a moisture constant in place of an hourly moisture measurement.

(2) **Alternative Monitoring Systems Under Part 75, Subpart E**

An AAR or AAAR of a non-Part 75 NO_x budget unit may petition the State regulatory agency to use an alternative monitoring methodology meeting the requirements of Subpart E of Part 75. The State regulatory agency must approve this petition before an owner or operator operates the alternative monitoring system for the NO_x Budget Program. If the methodology must be incorporated into a 40 CFR Part 75 permit under Title V subject to State and EPA approval, the methodology must also be approved by EPA.

(3) **Appendix E NO_x Correlation Methodology**

An owner or operator of a NO_x budget unit combusting only oil and/or gas who is not required to install and operate NO_x CEMS may develop a correlation curve between the NO_x emission rate of the unit and the heat input of the unit as defined in Appendix E of 40 CFR Part 75. An owner or operator shall use the hourly heat input of the unit to determine NO_x emission rate based on a heat input/NO_x correlation curve. Representative testing may be done at a limited number of identical turbines if the procedures in this guidance are followed.

(4) **Unit-specific Default NO_x Rate**

An owner or operator of a NO_x budget unit combusting only oil and/or gas who is not required to use NO_x CEMS may develop and use a unit-specific default NO_x emission rate factor. This rate is determined by selecting the highest reported hourly rate during four-load level reference method testing. Representative testing may be done at a limited number of identical turbines if the procedures in this guidance are followed. Default rates established by tests performed between July 1, 1993 and July 1, 1997 may be accepted by the State regulatory agency in lieu of retesting.

(5) **Generic Default NO_x Rate**

An owner or operator of a NO_x budget unit combusting only oil and/or gas who is not required to use NO_x CEMS may use the following generic default emission rates based on fuel combusted and type of unit.

TABLE 2: DEFAULT NO_x RATES BY UNIT CATEGORY AND FUEL TYPE

Unit/Fuel Category	Default Rate
Gas-fired Turbines	0.7 lb/mmBtu
Oil-fired Turbines	1.2 lb/mmBtu
Gas-fired Boilers	1.5 lb/mmBtu
Oil-fired Boilers	2.0 lb/mmBtu

C. **Requirements for Determining Heat Input**

(1) **Flow Monitoring and Diluent CEMS**

An owner or operator of a NO_x budget unit using NO_x CEMS to measure NO_x emission rate may elect to measure stack flow and diluent (O_2 or CO_2) concentration and use the procedures in 40 CFR Part 75 Appendix F to determine hourly heat input. For flow monitoring systems, an owner or operator must meet all of the applicable requirements of Part 75, including the monitoring plan, initial certification testing and ongoing QA/QC requirements.

(2) **Fuel Flow Monitoring and Fuel Sampling**

An owner or operator of a NO_x budget unit combusting only oil and/or gas may determine hourly heat input using fuel flow meter systems certified under 40 CFR Part 75 Appendix D, or as defined in Section III of this document.

An owner or operator of a unit combusting only oil and/or gas is required to perform fuel sampling necessary to estimate ozone season emissions only. Oil and/or gas sampling must be done according to the specifications below.

An owner or operator of a unit combusting oil may perform oil sampling to determine heat content of the fuel according to the requirements of Part 75 or according to one of the following alternatives:

(a) Sample each oil delivery and use the highest gross calorific value (GCV) measured from the last three shipments. This includes the last three shipments received prior to the start of the ozone season. For volumetric oil flow meters, an owner or operator should use the density associated with the selected GCV sample to convert from volume to mass of oil. If a shipment consists of multiple deliveries involving more than one delivery vessel, sample one delivery vessel and demonstrate that all of the delivery vessels came from the same source (i.e., the vessels were all loaded from the same storage vessel); or

(b) Sample from the fuel storage tank after each fuel delivery (or multiple deliveries from the same source) has been received during the ozone season. Use the actual GCV and density value sampled from the tank. Also sample from the tank between the last delivery before the start of the ozone season and the first time the fuel is combusted in the ozone season.

Perform oil sampling using one of the test methods in Appendix B of this document. In addition, when taking a sample, all samples should be split and labeled and a portion of the sample (at least 200 cc) should be maintained for one year.

An owner or operator of a unit combusting gas must determine the GCV of the gas in accordance with the monthly gas sampling requirements in Part 75 or the sampling methodologies in Appendix B of this document.

(3) **Long-Term Fuel Flow Rate Determinations**

An owner or operator of a NO_x budget unit combusting only oil and/or gas for which an owner or operator has elected to use a unit-specific or generic default NO_x emission rate may determine hourly heat input based on fuel usage measurements for a specified period that is longer than an hour. Each time period must begin on or after the beginning of the ozone season and conclude on or before the end of the same season.

Fuel sampling and analysis must conform to the requirements in Section (2) above, including the requirements to sample for each shipment or delivery received.

To use this methodology an AAR or AAAR must obtain prior State approval of the measurement approach. The petition must include a description of the periodic measurement methodology, including an assessment of its accuracy. To determine hourly heat input, an owner or operator should apportion the long term fuel measurement to operating hours during the ozone season. An AAR or AAAR may also petition the State regulatory agency for approval of a method to apportion long term fuel measurements if the unit combusts multiple non-solid fuels, if an owner or operator identifies and records the type of fuel(s) combusted for each hour in the period.

(4) **Alternative Heat Input Methodology**

An AAR or AAAR of a NO_x budget unit may petition the State regulatory agency to use an alternative method for determining heat input. This petition must include documentation specified in this section.

(5) **Maximum Heat Input Determination**

An AAR or AAAR of a NO_x budget unit may petition the State regulatory agency to use a unit-specific maximum hourly heat input based on the higher of the manufacturer's maximum rated capacity or the highest observed hourly heat input in the period beginning five years prior to the program participation date. The State regulatory agency may approve a lower maximum heat input if an owner or operator demonstrates that the highest observed hourly heat input in the last five years is not representative of the unit's current capabilities because modifications have been made to the unit limiting its capacity permanently.

TABLE 3: SUMMARY OF NON-PART 75 NO_x AND HEAT INPUT OPTIONS

NO_x Monitoring Options	Heat Input Monitoring Options	Who Can Use?
NO_x Emission Rate CEMS or Part 75 Alternative Monitoring Systems	Stack Flow Monitors, F factors and Diluent monitor	All units
	Hourly Fuel Flow Monitoring	Oil/gas units
	Hourly Alternative Heat Input Monitoring (boiler efficiency, hourly fuel usage, other)	Any unit with approved petition
	Unit-Specific Maximum	Any unit with approved petition
NO_x Concentration and Flow CEMS	Not required, unless specified by State rule or other State action	All units

(cont.)

TABLE 3: SUMMARY OF NON-PART 75 NO_x AND HEAT INPUT OPTIONS (cont.)

NO_x Monitoring Options	Heat Input Monitoring Options	Who Can Use?
NO_x/Heat Input Correlation (Part 75 Appendix E)	Hourly Fuel Flow Monitoring	Oil/gas units ≤ 250 mmBtu/hr capacity Oil/gas peaking units > 250 mmBtu/hr capacity
	Hourly Alternative Heat Input Monitoring (boiler efficiency, hourly fuel usage, other)	Non-solid fuel units with approved petition
Default Emission Factor (Either Unit-Specific or Based on Unit Category)	Hourly Fuel Flow Monitoring	Oil/gas units ≤ 250 mmBtu/hr capacity Oil/gas peaking units > 250 mmBtu/hr capacity
	Hourly Alternative Heat Input Monitoring (boiler efficiency, fuel usage, other)	Non-solid fuel units with approved petition
	Long Term Fuel Flow Monitoring or Fuel Measurements	Oil/gas units ≤ 250 mmBtu/hr capacity Oil/gas peaking units > 250 mmBtu/hr capacity
	Unit-Specific Maximum	Non-solid fuel units with approved petition

D. **Common and Multiple Stack Requirements for NO_x CEMS Units**

(1) When all the units that share a common stack are subject to the NO_x Budget Program, an owner or operator must do one of the following:

(a) Monitor NO_x emission rate and heat input at the common stack level;

(b) Monitor NO_x emission rate, moisture (if applicable) and heat input at the unit level for all units at the common stack;

(c) Monitor NO_x emission rate and moisture (if applicable) at the common stack level and heat input at the unit level;

(d) Monitor NO_x concentration, moisture (if applicable) and flow at the common stack level; or

(e) Monitor NO_x concentration, moisture (if applicable) and flow at the unit level for all units in the common stack. Locate the NO_x and flow monitors such that the unit-level measurements are fully representative of the NO_x mass emissions from the unit.

(2) When any units that share a common stack are not part of the NO_x Budget Program, an owner or operator must:

(a) Monitor only the affected units using allowable methodologies; for example, budget units whose emissions are measured prior to mixing with emissions from non-affected units sharing a common stack; or

(b) Petition the State regulatory agency for approval of a methodology to subtract mass emissions produced by the non-affected units. Any such methodology must be verifiable by using reported quality-assured data and may not systematically overestimate emissions from the non-affected unit(s); or

(c) Account for all emissions monitored at the common stack whether or not they are emitted from an affected unit.

(3) When a unit emits to multiple stacks or ducts and uses CEMS, an owner or operator must meet the following requirements:

(a) If each multiple stack or duct has flow monitoring systems, an owner or operator must measure the NO_x emission rate or NO_x concentration at each of the multiple stacks or ducts and calculate and report hourly NO_x mass emissions for each stack or duct.

(b) If stack flow or heat input is determined at the unit level, an owner or operator may use an hourly NO_x emission rate or NO_x concentration from CEMS in either stack to calculate unit hourly NO_x mass emissions, if

! There are no add-on NO_x controls at the unit;

! The unit is not capable of emitting solely through an unmonitored stack (i.e., has no dampers); and

! The NO_x emission rate in either stack or duct is representative of the NO_x emission rate in each stack. The rate is not considered representative if:

-- The measurements vary by more than 10%; or

-- For units with an average annual NO_x emission rate less than 0.40 lb/mmBtu, if measurements vary by more than 0.020 lb/mmBtu.

(c) If an owner or operator determines heat input at the unit level and the unit has a main stack and bypass stack which are only used simultaneously during periods when emissions are being rerouted from the main stack to the bypass stack or vice versa, an owner or operator may:

- Install NO_x CEMS in each stack and use the unit heat input and NO_x emission rate for the stack in use to determine hourly NO_x mass emissions; use the higher NO_x emission rate of the two stacks for all hours in which the bypass stack is in use concurrent with the main stack, or

- Install NO_x CEMS in the main stack only and use the maximum NO_x emission rate (as defined in 40 CFR Part 72.2) and unit heat input to determine NO_x mass emissions for any hour in which the bypass stack is in use or is in use concurrent with the main stack.

(d) If an owner or operator determines NO_x mass emissions by using a NO_x concentration CEM and flow monitoring system, an owner or operator must monitor at each stack or duct. The NO_x CEMs and the flow monitoring systems must be located such that the stack level measurements are fully representative of the NO_x mass emissions from the unit.

E. **Common Pipe Requirements for Oil and Gas Units Using Fuel Flow Meters**

An owner or operator using fuel flow to calculate heat input may measure fuel flow at a common pipe serving multiple units if all units use the same unit-specific or generic default NO_x emission rate. If an owner or operator determines NO_x emission rate using CEMS or the Appendix E methodology, fuel flow must be monitored on a unit basis.

F. **Appendix E Requirements**

(1) **Units with Add-on Controls**

For any unit using add-on emission controls and 40 CFR Part 75, Appendix E methodology, an owner or operator must identify representative ranges of operational parameters. The ranges indicate proper operation of the NO_x control equipment. Additionally, an owner or operator must record the control equipment operating parameters during each hour of testing and unit operation. The records of the representative ranges and the recorded hourly parameter values must be maintained on-site (or at a location known and accessible to the State regulatory agency if on-site storage is not feasible) in a form suitable for inspection. Retain records for at least three years from the date of each record for data recorded during unit operation and until testing is repeated for information recorded during testing. For any hour of unit operation in which add-on emission controls are not operating within a range specified for those parameters an owner or operator must apply missing data procedures. The parameters should include, but are not limited to, the NO_x Control Equipment Parameters in Table 1 (Part 1: Section II.B).

(2) **Units with Configuration Problems**

An AAR or AAAR of a NO_x budget unit that cannot comply with the testing procedures specified in Appendix E because of the physical configuration of the unit and associated stack and ductwork may petition the State regulatory agency for a modification to the testing procedures. An AAR or AAAR must obtain State approval before proceeding with any tests.

G. **Testing for Identical Turbines**

An AAR or AAAR of identical non-Part 75 turbines may apply to the State regulatory agency to perform representative testing at a limited number of turbines to create an Appendix E heat input versus NO_x emission rate correlation curve or to determine a unit-specific NO_x emission rate. To be considered identical, the turbines must be the same size (based on maximum rated heat input), manufacturer, model, fuel, and history of modifications. During similar operating conditions the stack temperature or turbine outlet temperature for any one unit may not vary by more than ± 50 °F from the average turbine outlet temperature for all of the units. Turbines in an identical group may be located in different jurisdictions and may be owned by different companies. If the turbines are located in different State or agency jurisdictions, all responsible agencies must receive and approve the application before testing begins.

Where multiple tests are performed for a group of identical units for Appendix E, perform all tests at the same or equivalent load levels. Calculate the results for each unit separately and average the results at each comparable load level to create a single correlation curve for the group of identical units.

An owner or operator must perform the following number of tests and create average correlation curves or unit specific emission rates which will be applied to all identical turbines in the group, as follows:

TABLE 4: TURBINE/TEST NUMBER REQUIREMENTS

# of Turbines	# of Tests
2	1
3 to 6	2
7 to 10	3
More than 10	# of turbines/3

In order to use representative testing for three or more units, an owner or operator must demonstrate that the NO_x emission rate at each tested unit does not vary:

(1) By more than 10% from the average of the NO_x emission rate at the corresponding load of all of the units tested; or

(2) If the average NO_x emission rate for all tests is less than or equal to 0.20 lb/mmBtu, by more than 0.020 lb/mmBtu.

A State regulatory agency may disallow the use of this procedure or may require testing at additional units for any reason, including but not limited to:

! Differences in the way the units are operated and or maintained;

! Differences in geographic factors at unit locations, such as variability in average ambient temperature;

- Differences in applicable emission limits; or

- Fuel variability.

If testing is being performed at more than three identical units to determine a unit-specific NO_x emission rate, an owner or operator may perform multiple load testing at two units to develop a general NO_x versus load relationship. If the test results for the first two tests result in the highest emission rate at both units occurring at the same load level, perform one load level testing at that load level for the remaining units that must be tested.

H. **Unit-Specific Default Emission Rate Determinations**

An owner or operator of a NO_x budget unit may perform testing as specified in Section III to determine a unit-specific maximum potential NO_x emission rate for each type of fuel combusted. Do not test during any hour in which multiple fuels are combusted. For hours in which multiple fuels are combusted, use the highest NO_x emission rate associated with any of the fuel types to calculate NO_x mass emissions.

If a unit uses any add-on emission controls, an owner or operator must identify the appropriate operating and control equipment parameters, must specify in the monitoring plan operating parameter ranges indicating normal operation and must monitor these parameters during all hours of unit operation. For any hour in which the parameters fall outside of these ranges, an owner or operator must use the appropriate missing data procedures.

I. **Calculating Heat Input for Units Using Long Term Fuel Measurements**

An owner or operator of an oil and/or gas-fired unit that uses a unit-specific or generic default NO_x emission rate may determine heat input on a non-hourly periodic basis.

For units combusting a single fuel, an owner or operator must apportion the fuel usage for the budget period based on megawatt or steam load as follows:

$$Hourly\ fuel\ usage = Total\ fuel\ x\ \frac{Hourly\ load}{Total\ load}$$

For units combusting multiple fuels during any hour in the budget period, an owner or operator may apportion each fuel equally to operating hours during which that fuel was combusted, or may petition to use an alternative apportionment methodology.

J. **Requirements for Heat Input Methodology Petitions**

A petition for the use of an alternative heat input methodology must include the following information. An owner or operator must receive approval of the petition before using the proposed methodology for measuring or reporting emissions.

(1) A description of the alternative methodology, including schematics or other diagrams, as appropriate;

(2) A description of equipment, sampling techniques or monitoring technology used as part of the methodology;

(3) A test protocol describing test procedures, schedule and proposed criteria as certification requirements comparable to Section III;

(4) An explanation of the technical basis for test procedures (such as fuel analysis procedures) used as part of the methodology;

(5) A description of ongoing QA/QC activities comparable to the requirements in Section IV;

(6) A detailed description and example of the reporting methodology for the alternative heat input methodology;

(7) A detailed description of the missing data procedures which will be used to provide data during periods in which any of the components needed for the approved methodology are unable to provide data;

(8) If the alternative methodology includes fuel sampling and fuel usage data for solid fuels, an owner or operator must provide a detailed description of the sampling frequency and approach;

Specific requirements include:

(a) Samples must be taken from each fuel feed stream.

(b) A minimum of two subincrement point samples must be collected from each point of sample acquisition for each discrete hourly time period the process is operating.

(c) Sample collection must be by means which do not allow for operator discretion with respect to the portions of samples retained or rejected.

(d) An hourly increment point sample must consist of all subincrement point samples collected at a particular sampling acquisition point during a discrete hourly time period and must consist of all hourly increment point samples for a particular combustion unit during a particular discrete hourly time period.

(e) A daily composite unit sample must consist of all subincrement point samples collected for a particular combustion unit during a discrete daily time period.

(f) Subincrement point samples must be collected in proportion to the weight of fuel passing the point of sample acquisition during the time period represented by the samples. The factor of proportionality (pounds of sample per pound of fuel burned) must be as nearly identical as possible for all samples acquisition points within a particular system.

(g) A representative daily laboratory sample must be prepared from each daily sample according to methods approved by the state.

(h) Each daily laboratory sample must be analyzed to determine Btu/pound by methods approved by the State.

(9) If the alternative heat input methodology is based on boiler efficiency testing an AAR or AAAR must submit the following information:

(a) The results of boiler efficiency tests performed within the previous five years and a certification that the boiler has undergone no changes that will have a major effect on efficiency since the testing date.

(b) A description of the boiler efficiency tests and documentation that the boiler efficiency testing was performed at a minimum of three evenly spaced loads representative of normal operation; or, if the unit operates within a very limited load range except for startup, shutdown and maintenance events, documentation of this operational pattern and a request to accept testing at less than three load levels.

(c) A proposed schedule for periodic retesting of boiler efficiency.

II. MONITORING PLAN REQUIREMENTS

An owner or operator of a NO_x budget unit shall maintain a monitoring plan which documents the methodologies used to measure and report emissions and heat input data under the NO_x Budget Program. This monitoring plan shall include the following information:

A. Contents of the Monitoring Plan

(1) Facility Information

! EPA Facility ID
! State Facility ID
! Code for Primary State Regulatory Agency (to be assigned)
! County
! Source Category (Electric Utility, Cogen, Pulp and Paper, Petroleum Refinery, Process Boiler, etc.)

(2) Unit Definition Information

! Unit IDs
! AIRS Point ID
! Unit Short Name
! OTC Class: Existing, New, Opt-in, etc.
! Boiler Type
! Primary Fuel
! Secondary Fuel(s)
! NO_x Controls

! Date on Which NO_x Controls Were Installed and Optimized
! NO_x Monitoring Approach
! HI Monitoring Approach: 75 CEMS, Part 75 AMS, 75 App D, NO_x Budget AMS, Boiler Efficiency Testing, Default Maximum, Periodic Fuel Measurements, etc.
! Effective Participation/Compliance Dates
! Maximum Heat Input Capacity
! On-line date (for New Units Particularly)
! Maximum Load Value

(3) **Unit/Stack/Pipe Identification**

For any unit measuring emissions at a common stack using CEMS or measuring fuel flow for a common fuel source, an owner or operator must identify the units and assign a common stack or pipe ID. For any single unit emitting through more than one stack, including bypass stacks, an owner or operator must identify each emission point and assign a multiple stack ID to each point.

All stack and pipe IDs must be no more than six alpha-numeric characters and must contain the following required prefixes:

! CS: for all common stacks

! CP: for all common pipes or common fuel sources

! MS: for all multiple ducts

(4) **Unit Configuration and Monitoring Location Information**

An owner or operator must maintain in the monitoring plan the following unit and monitoring location information:

(a) **Facility Description/Location**

A general description of the facility and location, including clear identification of each NO_x budget unit within the facility.

(b) **Other Information**

For each NO_x budget unit, specific information on monitoring and reporting, including:

! Schematics, including identification of all monitoring systems, control equipment, fuel storage locations, fuel flow, sampling points, or other parametric monitoring devices.

! For units using CEMS, information on the location of CEMS demonstrating conformance with 40 CFR Part 75, Appendix A, Section 1.2 for flow monitors and 40 CFR Part 60, Appendix B, Performance Specification 2 for gas monitors.

! For oil and gas units using CEMS only, documentation of moisture constant proposed for use as moisture adjustment for CEMS measuring on an inconsistent moisture basis.

! Description and appropriate documentation for the use of any non-CEMS monitoring approach as specified in Section I.

! Data flow diagrams, including a clear differentiation of automated data collection and manual data entry.

! List of record types and specific data elements to be used to report emissions and heat input, as required in this guidance and applicable EDR.

! Description of the missing data procedures to be used, including a brief description of the proposed DAHS test protocol used for certification, consistent with the requirements in Section VI.

(5) **NO_x Control Equipment Parameter Information**

For each unit which uses add-on NO_x controls and for which CEMS, Appendix E procedures or unit-specific default emission rates are used to determine NO_x mass emissions, an owner or operator must identify in the monitoring plan:

(a) Operational parameters associated with the unit and the control device to serve as indicators of effective operation;

(b) The appropriate ranges of operation;

(c) Method of data collection;

(d) The time periods to which those parameters and ranges are applicable or effective;

(e) A justification of the basis on which parameters and appropriate ranges have been determined:

(f) Simultaneous CEMS or reference method monitoring data and parametric control equipment data collected during normal operation of the control equipment demonstrating that the appropriate ranges have been determined;

(g) For units using parametric data to certify normal operation for standard CEMS missing data period, an owner or operator must retain on-site (or other location known and accessible to the State regulatory agency if it is not feasible to store them on-site), simultaneous CEMS emission data as well as parametric control equipment data for 720 hours of normal operation; and

(h) For units using parametric data as part of Appendix E or unit-specific default rate testing, an owner or operator must retain on-site (or other location known and accessible to the State regulatory agency if it is not feasible to store them on-site), all parametric control equipment data obtained during the testing period.

(6) **Monitoring System and Component Information**

An owner or operator of a NO_x budget unit must identify all monitoring systems and any associated components used to monitor, estimate or report emissions and heat input. Each system at a unit or stack must be defined using a unique three-digit system ID. Each component at a unit or stack must also be identified using a unique three-digit component ID.

For each system, an owner or operator must identify the parameter monitored, assign a three-digit system ID and indicate whether it is a primary or backup system. For each component an owner or operator must assign a three-digit component ID and identify the sample acquisition method or measurement approach, the type of component, and the component manufacturer, model and serial number. Each system must include, as components, the software component(s) used to collect, store, calculate and report emissions data.

The following types of systems may be included in plans for non-Part 75 units for the NO_x Budget Program:

! NO_x Emission Rate System: This monitoring system is used to determine NO_x emission rate in lb/mmBtu. It is comprised of a NO_x concentration monitor, CO_2 or O_2 diluent monitor and DAHS software;

! NO_x Part 75 Alternative Monitoring System (AMS): This monitoring system is used to determine NO_x emission rate in lb/mmBtu. It is comprised of components defined in the petition approved as meeting the requirements of Subpart E of Part 75.

! NO_x Concentration System: This monitoring system measures NO_x concentration, and is used in conjunction with a separately certified flow monitoring system to calculate NO_x mass emissions. It is comprised of a NO_x concentration monitor and DAHS software.

! Appendix E NO_x System: This monitoring system is used to determine NO_x emission rate in lb/mmBtu from hourly heat input and the NO_x emission rate from a NO_x/heat input correlation curve. The system is comprised of only DAHS software.

! NO_x Default Rate System: This monitoring system reports a fixed default NO_x emissions rate in lb/mmBtu. It is comprised of only DAHS software.

! Flow Monitoring System: This monitoring system measures stack flow rate in standard cubic feet per hour (scfh). The flow rate is used to calculate heat input or NO_x mass emissions. The system is comprised of, at a minimum, a flow monitor and DAHS software.

! CO_2 or O_2 System: This monitoring system measures percent CO_2 or O_2 for the calculation of hourly heat input, if an analyzer other than the diluent component of the NO_x emission rate system is used. It is comprised of a CO_2 or O_2 analyzer and DAHS software.

! Moisture System: This system measures hourly percent moisture for the calculation of hourly heat input, NO_x emission rate or NO_x mass emissions, if an hourly moisture adjustment is required. A moisture system is comprised of a moisture sensor and DAHS software or one or more dry and wet basis oxygen analyzers and DAHS software. One of these oxygen analyzers may also be a component of the NO_x emission rate system described above.

! GAS System: This monitoring system measures gas flow in 100 standard cubic feet per hour. Gas flow is used to calculate heat input. This system is comprised of, at a minimum, a gas fuel flow meter and DAHS software. A gas system using periodic long term gas flow measurements which are manually entered may be comprised of only DAHS software. A gas system may also include a gas chromatograph component to measure hourly GCV.

! OILV System: This monitoring system measures hourly volumetric oil flow rate. It is comprised of, at a minimum, an oil fuel flow meter and DAHS software.

! OILM System: This monitoring system measures hourly mass of oil combusted in pounds per hour. This value is used to calculate heat input. It is comprised of, at a minimum, an oil fuel flow meter and DAHS software.

! Heat Input System: This system measures heat input based on facility-specific and approved alternative heat input methodologies (such as boiler efficiency testing). It is comprised of DAHS software and any other components required in an approved petition. (A heat input system should not be defined if heat input is determined using a flow monitoring system and diluent monitor.)

Tables 5 and 6 summarize the types of parameters associated with each type of monitoring system, and the units and precision for reporting values for all parameters.

TABLE 5: PRIMARY PARAMETER REPORTING REQUIREMENTS

Type of System	Parameter	Units	Precision
NO_x Emission Rate	NO_x Emission Rate	lb/mmBtu	3 decimal
NO_x Concentration	NO_x Concentration	ppm	1 decimal
Flow	Stack Flow	scfh	Integer
NO_x Emission Rate	CO_2 or O_2 Concentration	%	1 decimal
Moisture	H_2O	$\%H_2O$	1 decimal
GAS	Gas Flow	100 scf/hr	1 decimal

(cont.)

TABLE 5: PRIMARY PARAMETER REPORTING REQUIREMENTS (cont.)

Type of System	Parameter	Units	Precision
OILM	Mass Oil Flow	lbs/hr	1 decimal
OILV	Volumetric Oil Flow	gal/hr scf/hr bb/hr cubic meter/hr	1 decimal
Heat Input	Heat Input	mmBtu	1 decimal

TABLE 6: SECONDARY PARAMETER REPORTING REQUIREMENTS

Parameter	Units	Precision
Density of Oil	lb/scf lb/gal lb/barrel lb/cubic meter	2 decimal
GCV of Oil	Btu/lb	1 decimal
GCV of Gas	Btu/100 scf	1 decimal
GCV of Coal	Btu/lb	1 decimal
Hourly Budget Period Heat Input	mmBtu	Integer
Budget Period NO_x	Tons	1 decimal

(7) **Table C Formula Requirements**

An owner or operator of a NO_x budget unit must include in the monitoring plan formulas used to calculate NO_x emission rate, heat input and NO_x mass emissions, as appropriate to the monitoring methodologies selected and/or approved for use in the program.

(8) **Span, MPC, MEC, MPF and Default Information**

An owner or operator of a NO_x budget unit using CEMS must maintain a record of all span and range values, maximum potential concentration, maximum expected concentration, maximum potential flow values, moisture constants, and documentation of the basis for determining these values. An owner or operator of a NO_x budget unit using default emission rates or maximum heat input values must maintain a record of these values and documentation of the basis for determining these values. An owner or operator of a NO_x budget unit using missing data procedures requiring the use of maximum NO_x emission rate or other maximum or minimum values must maintain a record of these values and documentation of the basis for the values.

(9) **System Certification Status Information**

For each system defined for use in the NO_x Budget Program an owner or operator must maintain for a minimum of five years current and historic information on the certification and recertification status of all monitoring systems.

(10) **Fuel Flow Meter Information**

An owner or operator of a NO_x budget unit using fuel flowmeters to calculate heat input must maintain a record of initial and ongoing calibration methods and maximum potential flow rate for all fuel flow systems.

B. **Monitoring Plan Submission Requirements**

An AAR or AAAR for a non-Part 75 NO_x budget unit subject to the program on July 1, 1998 must submit one copy of a complete monitoring plan to the appropriate State regulatory agency and one copy to U.S. EPA by the earlier of January 1, 1998 or the date required by applicable State regulations. For "new" budget units subject to the program after July 1, 1998 an AAR or AAAR must submit a complete monitoring plan 90 calendar days prior to the projected initial participation date for the unit.

An AAR or AAAR of an existing unit in extended shutdown on the initial participation date must notify the State regulatory agency about the shutdown condition and the projected unit start-up date by the monitoring plan submission date. An AAR or AAAR must submit complete monitoring plans 90 calendar days prior to the projected start-up date of the deferred unit. If start-up is delayed, an AAR or AAAR may renotify the State agency about the revised projected start-up date. An owner or operator is responsible for accounting for all ozone season emissions from the unit after it resumes operation, regardless of whether the monitoring systems are certified (see Section III (F) of this document for reporting requirements for non-certified units).

This monitoring plan submission must contain the following:

(1) **Electronic Submissions of Monitoring Plan Forms Tables A, B, C, and D per applicable *EDR***

For all monitoring plan submissions, the electronic submissions of Tables A, B, C and D constitute the "official" copy of this data and will be relied upon by the Acid Rain Division and the State regulatory agency as the basis for future submissions relating to certification, quality assurance and emissions reporting.

For information on the formats, organization and file naming conventions of EDR monitoring plan data, consult the ***Acid Rain CEMS Program Submission Instructions*** (May 1995) and the ***NO_x Budget Program Monitoring Certification and Reporting Instructions***.

(2) **Hardcopy Monitoring Plan Submission**

An owner or operator must maintain and submit the following documentation as part of the hardcopy monitoring plan:

! Information and documents specified in Sections I and II of this document including documentation supporting the use of any non-CEMS monitoring approach.

- For monitoring approaches which do not require specific certification tests (or for which certification test data or its equivalent is already available), submit this information with the monitoring plan, in lieu of a separate certification application. Clearly indicate that all required certification information is included in the submission.

- Copies of or References to Petitions and Related Approvals

- Certification Statements

C. **Approvals for Monitoring Methodologies Petitions**

An AAR or AAAR who petitions a State regulatory agency to use an alternative monitoring methodology must submit the petition prior to the monitoring plan submission date, as required by applicable State regulation. Although the petition may include many elements of information required for a monitoring plan submission, it does not constitute a monitoring plan submission. An AAR or AAAR must receive approval from the State regulatory agency prior to the submission of the monitoring plan or reporting of data based on the proposed methodology.

Any alternative monitoring methodology or other petition which must be incorporated into a permit under Title V or 40 CFR Part 70 which is subject to State and EPA approval, must also be submitted to and approved by the U.S. EPA.

D. **Changes to the Monitoring Plan**

When changes to the monitoring plan are the result of normal changes in equipment or operational changes and do not affect the fundamental monitoring approach, an AAR or AAAR should inform the State regulatory agency of these changes in the electronic monitoring plan data submitted in a periodic report. Monitoring plan changes requiring EDR submissions include:

- Like-kind equipment component replacements (any component originally identified in the monitoring plan that is replaced by a component of the same model and manufacturer)

- Non-like-kind equipment component replacements (any component originally identified in the monitoring plan that is replaced by a component that is not of the same model and manufacturer)

- DAHS version upgrades

- Span changes for CEMS

- Maximums increased due to operational changes or exceedances of current maximums

In addition, these changes may require recertification testing and reporting of test results, as defined in Section V of this document. Note that replacement of components that are not identified in the monitoring plan may also require recertification.

However, if an owner or operator proposes to change the basic monitoring approach (for example, to switch from the use of a generic default value to a unit-specific default value or Appendix D approach) an AAR or AAAR must submit a revised monitoring plan at least 60 calendar days prior to the use of the proposed approach or as required by the applicable State regulation. Owners and operators are encouraged to time the use of a new monitoring methodology to coincide with the beginning of the ozone season and to submit and certify appropriate systems during the non-ozone season.

III. CERTIFICATION REQUIREMENTS AND PROCEDURES

A. Pretest Notification Requirements

An AAR or AAAR must conform to applicable State requirements for notification and/or submittal and/or approval of a test protocol relating to any scheduled certification, quality assurance or recertification test involving relative accuracy testing, Appendix E testing or unit-specific default emission rate testing. Approvals of monitoring petitions may also contain a test notification requirement as a condition of approval. This requirement does not preclude the use of prior or historical test data to meet certification test requirements, if the State approves.

B. Span and Range Requirements for CEMS

(1) Alternatives for Establishing Span and Range

To ensure measurement accuracy for new or existing CEMS, an owner or operator must establish and use span and range according to the following NO_x Budget Program requirements or according to alternative regulatory requirements under NSPS or State CEMS regulations. An owner or operator may also petition for approval of alternative span and range determinations on a unit-specific basis.

If span is exceeded, an owner or operator must follow the procedures in this document to determine span and range.

(2) NO_x Span and Range

(a) Determining MPC, MEC, Span and Range for the NO_x Budget Program

Establish the appropriate span for each unit or stack by determining the unit or stack maximum potential concentration (MPC) for uncontrolled units and the maximum expected concentration (MEC) for controlled units.

1. MPC for Uncontrolled Units

Determine the maximum potential concentration for an uncontrolled unit using one of the following:

a. A default value from Tables 2-1 and 2-2 of 40 CFR Part 75, Appendix A based on the type of fuel and boiler type(s) associated with the unit or stack.

b. A minimum of 30 days of historical CEM data. If historical data is used, the data must represent various operating conditions including the minimum safe and stable load, normal load and maximum load.

c. Reference test results based on tests performed according to Method 7E of 40 CFR Part 60, Appendix A. Test the unit, or group of units sharing a common stack, at the minimum safe and stable load, the normal load and the maximum load. If the normal load and maximum load are identical, an intermediate level need not be tested. Operate at the highest excess O_2 level expected under normal operating conditions. Perform at least three runs with three traverse points of at least 20 minutes duration at each operating condition. Select the highest NO_x concentration from all measured values as the maximum potential concentration for NO_x.

2. **MEC for Controlled Units**

Determine the maximum expected concentration for a controlled unit using one of the following:

a. Percent Reduction Equation

$$MEC = \frac{MPC(100-RE)}{100}$$

where:

MEC = Maximum expected concentration (ppm)
MPC = Maximum potential concentration determined using the values in Tables 2-1 and 2-2 of 40 CFR Part 75, Appendix A (ppm)
RE = Expected average design removal efficiency of control equipment (%)

b. A minimum of 30 days of historical CEM data. If historical data is used, the data must represent various operating conditions including the minimum safe and stable load, normal load and maximum load.

c. Reference test results based on tests performed according to Method 7E of 40 CFR Part 60, Appendix A. Test the unit, or group of units sharing a common stack, at the minimum safe and stable load, the normal load and the maximum load. If the normal load and maximum load are identical, an intermediate level need not be tested. Operate at the highest excess O_2 level expected under normal operating conditions. Perform at least three runs with three traverse points of at least 20 minutes duration at each operating condition. Select the highest NO_x

concentration from all measured values as the maximum potential concentration for NO_x.

3. **Determining Span from MPC or MEC**

Set the span for the unit or stack at a value between 100% and 125% of either MPC for uncontrolled units or MEC for controlled units.

4. **Determining Instrument Range**

Set an instrument range equal to or greater than 125% of MPC or MEC, such that the majority of measured values are within 20 - 80% of the range.

(b) **Requirements for Additional High Analyzer Ranges**

If an owner or operator is required to have an additional high analyzer range for the purposes of meeting any other State or Federal requirement, an additional high analyzer range must be certified for purposes of this program.

If an owner or operator exceeds or expects to exceed the single instrument range selected according to the guidelines above (for example, for a controlled unit during hours when the controls are not operating) he or she may elect to use a dual-range analyzer or install and certify as a separate monitoring system a second high scale analyzer. Set the span of this high scale range or separate analyzer based upon MPC determined for the unit or stack using Tables 2-1 and 2-2 of 40 CFR Part 75, Appendix A.

(c) **Requirements Resulting from Range Exceedances**

If the recorded emissions are equal to or outside of the full scale range of the normal range analyzer or the high range of a dual range analyzer for any hour, an owner or operator must:

1. **For an Uncontrolled Unit and an Exceedance Not Associated with Fuel Switching**

Report NO_x concentration equal to 150% of the full scale range for every hour that a value equal to or outside of the full scale range is recorded. Increase the full scale range to avoid further exceedances.

2. **For an Uncontrolled Unit and An Exceedance Associated with Fuel Switching**

Report NO_x concentration using the MPC based on Tables 2-1 and 2-2 of 40 CFR Part 75, Appendix A. If the fuel is an emergency fuel which will be used for fewer than 72 hours during the ozone season, it is not necessary to modify the existing full scale range. If the fuel will be used for 72 or more hours in an ozone season, increase the range so that the monitor is capable of reading all of the NO_x emission values when the fuel is burned. If an owner or operator also intends to burn the fuel associated with the original range (and the new range is greater than 100 ppm) ensure that the majority of the readings will be between 20% and 80% of the new full scale range. If this cannot be done, an owner or operator must install and certify an additional high range analyzer capable of reading the emission values when the fuel resulting in higher NO_x emissions is burned.

3. **For a Controlled Unit Whose Control Device is Not Operating**

Report NO_x concentration using the MPC selected from Tables 2-1 and 2-2 of 40 CFR Part 75, Appendix A. An owner or operator must install and certify an additional high analyzer range if the full scale range is exceeded for 72 or more hours in the ozone season. This high range must be capable of reading all uncontrolled emissions from the unit.

4. **Span and Range for High Analyzer Ranges**

The span for the high analyzer range should be set at between 100% and 125% of the MPC, based on the conditions when the normal span was exceeded. The range should be set equal to or greater than 125% of the MPC.

(3) **Diluent Span and Range**

For an O_2 monitor (including O_2 monitors used to measure CO_2 emissions or percentage moisture), select a span value between 15 and 25 percent O_2. For a CO_2 monitor, select a span value between 15 and 20 percent CO_2. Notwithstanding these requirements, if the O_2 or CO_2 concentrations are expected to be consistently below 15 percent O_2 or CO_2, an alternative span value less than 15 percent O_2 or CO_2 may be used, provided that an acceptable technical justification is provided in the monitoring plan. Select the full-scale range of the instrument to be greater than or equal to the span value.

(4) **Flow Span and Range**

(a) **Determining Maximum Potential Velocity (MPV)**

Determine the MPV for each unit or stack in units of sfpm (wet basis) using either:

1. Velocity Traverse Testing as defined in 40 CFR Part 75, Appendix A, Section 2.1.4. Use the highest velocity measured at or near the maximum unit operating load; or

2. Equation A-3a or A-3b in 40 CFR Part 75, Appendix A, Section 2.1.4.

(b) **Determining Maximum Potential Flow (MPF)**

To determine the MPF for the unit or stack, multiply the MPV by the inside cross sectional area (in square feet) of the flue at the flow monitor location. Then multiply this value by 60 to convert from minutes to hours, as follows:

$$MPF(scfh_{wet}) = MPV(sfpm_{wet}) \times A(ft^2) \times 60(m/h)$$

(c) **Determining Flow Span for Non-Differential Pressure (Non-DP) Flow Meters**

1. Calibration MPF is maximum potential flow expressed in the units of measure used for calibration purposes.

To determine calibration MPF, multiply MPF (in scfh, wet basis) by the appropriate conversion factors to convert to calibration units, as follows:

$$\textit{Calibration MPF (cal units)} = \textit{MPF}(\textit{scfh}_{\textit{wet}}) \times [\textit{Conversion to cal units}]$$

Do not calculate this value if a differential pressure (DP) type flowmeter is used.

2. Set flow span between 100% and 125% of the calibration MPF and round up to no fewer than two significant figures. In other words, the rounded result should have at least two significant figures and should follow engineering convention by not having more non-zero figures than the precision of the measured values used in the calculation (40 CFR Part 75, Appendix A, Section 2.1.4).

$$\textit{Span (cal units)} = \textit{Calibration MPF (cal units)} \times (1.00 \text{ to } 1.25)$$

(d) **Determining Flow Span for Differential Pressure Flow Meters**

For DP flow meters, set the span between 100% and 125% of the MPV (sfpm). Convert the result from sfpm to units of actual feet per second (afps). Then, use Equation 2-9 in Reference Method 2 (40 CFR Part 60, Appendix A) to convert the actual velocity to an equivalent delta P value in inches of water. Retain at least two decimal places in the resultant delta P, which is the span value.

(e) **Determining Flow Monitor Full-Scale Range**

Select the range so that the majority of readings obtained during normal operation are between 20% and 80% of the full-scale range of the instrument. The full-scale range must be equal to or greater than 125% of the MPV.

(5) **Selection of Calibration Gas Based on Span**

An owner or operator must comply with 40 CFR Part 75 requirements for the selection and use of calibration gas levels based on a percentage of span for all linearity tests and for daily calibrations. For O_2 monitors, purified instrument air containing 20.9% O_2 may be used as the high-level calibration material.

(6) **Adjustment of Span and Range**

Adjust the range and (if appropriate) span value of the CEMS within 60 days of the end of any calendar quarter in which the majority of the readings are not within 20%

or 80% of the range (except for full-scale exceedances, which require immediate corrective action). Whenever the span and/or range is adjusted, update the monitoring plan and include a rationale for the new span and/or range values. Whenever the span is adjusted, use calibration gases that meet the requirements of this guidance and are consistent with the new span value for the required daily calibration error tests and linearity checks.

C. **Initial Certification and Performance Requirements**

An owner or operator must perform and pass initial certification tests appropriate to the monitoring methodology used at each unit, as follows:

(1) **NO_x CEMS Initial Certification Requirements**

For units using either a NO_x concentration system to measure NO_x in ppm or a NO_x emission rate system to measure NO_x emission rate in lb/mmBtu, an owner or operator must:

(a) Perform or have previously performed for the NO_x concentration and diluent monitor (if applicable) successfully one of the following:

1. For instruments installed on or after July 1, 1997 or installed prior to July 1, 1997 and not subject to requirements to perform a 7-day calibration drift test, a 7-day calibration error test in accordance with the requirements of 40 CFR Part 75, Appendix A, Section 6.3; or

2. For CEMS subject to NSPS requirements or required to pass State specifications comparable to 40 CFR Part 60 and operational before July 1, 1997: 7-day calibration drift test as defined in 40 CFR Part 60; or

3. For CEMS at peaking units (as defined in 40 CFR Section 72.2) only: three daily on-line calibrations on consecutive operating days meeting the performance specifications in 40 CFR Part 75, Appendix A, Section 6.3.

(b) Perform successfully a linearity check of the NO_x concentration and (if applicable) diluent monitor in accordance with the requirements and performance specifications of 40 CFR Part 75, Appendix A, Section 6.2.

For low-emitting units using a NO_x span of 50 ppm or less, the linearity test for the NO_x component may be a two point test consisting of a check between 20% and 30% of span and one point between 80% and 100% of span. For low-emitting units using a NO_x span of 25 ppm or less, a quarterly linearity test may be performed using two points, zero and any non-zero point within the span.

(c) Perform successfully a cycle time test of the NO_x concentration and (if applicable) diluent monitor in accordance with the requirements and performance specifications of 40 CFR Part 75, Appendix A, Section 6.4.

(d) Perform successfully a relative accuracy test as required by 40 CFR Part 60 and 40 CFR Part 75.

1. Concurrent Testing

For NO_x emission rate systems, perform the relative accuracy tests for the NO_x and diluent components concurrently.

2. Performance Specifications

The relative accuracy of the NO_x concentration system or a NO_x emission rate system calculated on a ppm or lb/mmBtu basis, respectively, must be less than or equal to 20.0%; or if the average NO_x emission rate during the relative accuracy test audit of a NO_x emission rate system is less than or equal to 0.20 lb/mmBtu, the mean value of the measurements must be within $\pm$0.04 lb/mmBtu of the reference method mean value.

3. Data Adjustment Requirements

If the most recent successful relative accuracy test results exceed 10.0% (or $\pm$0.02 - 0.04 lb/mmBtu for low emitter NO_x emission rate systems), an owner or operator must adjust each hour of data measured and reported from this system by applying a factor of 1.1, as follows:

Adjusted NO_x Emission Rate or Concentration = NO_x Emissions Rate or Concentration * 1.1

(e) For any NO_x concentration system or NO_x emission rate system with a relative accuracy less than or equal to 10.0% (or for low emitters $\pm$0.02 lb/mmBtu for a mean NO_x emission rate of $\leq$0.20 lb/mmBtu, or $\pm$15 ppm for a mean NO_x concentration $\leq$250 ppm), perform a bias test on the relative accuracy test data using the procedures in 40 CFR Part 75, Appendix A, Section 7.6. If the bias test is failed, an owner or operator must adjust each hour of data measured and reported from this system using the bias adjustment factor (BAF), as required by 40 CFR Part 75, Appendix A, Section 7.6.5 and Appendix B, Section 2.3.3.

(2) **Certification Test Requirements for CO_2 or O_2 CEMS Used to Determine Heat Input**

(a) CO_2 or O_2 analyzers which are used to determine heat input, and which are part of a certified NO_x emission rate system are deemed to have passed the required initial certifications tests relating to CO_2 or O_2 components under the NO_x Budget Program. It is not necessary to define or certify separate systems for these components.

(b) CO_2 or O_2 analyzers which are used to determine heat input, but which are NOT part of a certified NO_x emission rate system must be defined and certified as a CO_2 or O_2 monitoring system. Perform and meet initial certification requirements as follows:

1. A 7-day calibration test (or equivalent tests as defined in Section III.C.(1)(a) above).

2. Three-point linearity test, in accordance with the requirements and performance specifications for CO_2 or O_2 analyzers of 40 CFR Part 75, Appendix A, Sections 3.2, 6.2 and 7.1 or as defined in Section III.C(b) above.

3. A relative accuracy test in accordance with the requirements of 40 CFR Part 75, Appendix A, Sections 3.3.3, 6.5 and 7.3.

   a. Performance Specifications

      The relative accuracy of the CO_2 or O_2 CEM system must be less than or equal to 20.0%. The relative accuracy test results are also acceptable if the mean difference of the monitor measurements and the corresponding reference method measurement calculated using Equation A-7 of 40 CFR Part 75, Appendix A is within ± 2.0%.

   b. Data Adjustments

      No data adjustments apply to CO_2 or O_2 measurements under this program.

4. A cycle time test in accordance with 40 CFR Part 75, Appendix A, Section 6.4.

(3) **Certification Test Requirements for Stack Flow Monitoring Systems Used to Determine Heat Input or NO_x Mass Emissions**

For a unit that uses a stack flow monitoring system to calculate hourly heat input or hourly mass emissions, an owner or operator must meet all the applicable initial certification requirements in 40 CFR Part 75, Appendix A, including a three-load flow relative accuracy test and a bias test. For flow monitoring systems installed on peaking units or by-pass stacks only a normal-load flow RATA is required.

An AAR or AAAR may petition the State regulatory agency to perform only a single-load flow RATA. States may approve the use of a single-load flow RATA for units that demonstrate operation at a constant load (operated within 10% of the average load for 90% of the time for the previous year).

If the flow monitoring system fails the bias test in 40 CFR Part 75, Appendix A, Section 7.6, an owner or operator must apply a BAF to each hour of data measured and reported from the system, as required in 40 CFR Part 75, Appendix A, Section 7.6.5.

(4) **Certification Test Requirements for Moisture Systems**

An owner or operator using hourly moisture readings to calculate heat input, NO_x emission rate or NO_x mass emissions must install and certify a moisture system by performing the following tests:

(a) For each analyzer or moisture sensor comprising the system, a 7-day calibration error test (or equivalent tests as defined in Section III.C(1)(a) above). Apply the performance specification for calibration error for wet and dry-basis oxygen analyzers specified in Section 3.1 in 40 CFR Part 75, Appendix A. The performance specification is 3.0% of span for moisture sensors.

(b) For moisture systems consisting of one or more wet and dry basis oxygen analyzers, a three-point linearity test, in accordance with the requirements and performance specification for CO_2 or O_2 analyzers in 40 CFR Part 75, Appendix A, Sections 3.2, 6.2 and 7.1 for each analyzer.

(c) For each moisture system, a relative accuracy test according to EPA Method 4 (either the standard procedure or the midget impinger procedure).

1. Performance Specifications

The relative accuracy of the moisture system must be less than or equal to 15.0%. The relative accuracy results are also acceptable if the difference between the mean value of the reference method measurements and the mean value of the moisture monitoring measurements is within $\pm 1.0\%$ H_2O.

2. Data Adjustments

No data adjustments apply to moisture measurements under this program.

(d) For moisture systems consisting of one or more wet or dry basis oxygen analyzers, a cycle time test for each analyzer in accordance with 40 CFR Part 75, Appendix A, Section 6.4.

(5) **Appendix E Initial Certification Test Requirements**

An owner or operator electing to determine NO_x mass emissions using a NO_x emission rate versus heat input correlation curve must perform tests specified in 40 CFR Part 75, Appendix E, Section 2.1. During the testing record all unit operating parameters required by Appendix E. If the unit has add-on emission controls, also record the control equipment operating parameters.

An AAR or AAAR may petition the State regulatory agency to perform Appendix E testing at fewer than four levels. States may approve the use of testing at fewer than four levels for units that demonstrate operation at a constant load (operated within 10% of the average load for 90% of the time for the previous year).

(6) **Maximum NO_x Emission Rate Certification Test Requirements**

If an owner or operator elects to use a unit-specific default NO_x emission rate, an owner or operator must define and certify a NO_x emission rate system for each fuel based on a rate determined using the following procedures:

(a) Determine all operating parameters for the unit and any associated add-on control equipment. Determine the recommended ranges for each of those parameters.

(b) Perform tests specified in 40 CFR Part 75, Appendix E, Section 2.1 for each type of fuel combusted by the unit for which a unit-specific default rate will be used.

(c) Record during testing all unit operating and control equipment parameters from (a) above to ensure that the unit is operating within those parameters.

(d) Record NO_x emission rate for each hour of the test and determine the maximum hourly NO_x emission rate during any hour of the test for the fuel combusted.

An AAR or AAAR may petition the State regulatory agency to perform testing at fewer than four levels. States will approve the use of testing at fewer than four levels for units that demonstrate operation at a constant load (operated within 10% of the average load for 90% of the time for the previous year).

In addition, an AAR or AAAR may petition for and the State regulatory agency may approve the use of data from alternative, previously conducted tests to determine a default NO_x emission rate if previous testing has been performed prior to May 1, 1997 to meet other State requirements. However, all tests performed on or after May 1, 1997 must meet the requirements of Appendix E and this document.

(7) **Certification Test Requirements for Gas, OILM and OILV Systems Used to Determine Heat Input**

For oil and or gas-fired units using fuel flowmeters to determine heat input, an owner or operator must certify the accuracy of each fuel flowmeter comprising the system either:

(a) According to the certification standards and procedures for fuel flowmeter performance in 40 CFR Part 75, Appendix D, Sections 2.1.5.1 or 2.1.5.2; or

(b) By documenting that all fuel flowmeters in the system are fuel flowmeters used by an owner or operator of the unit and the supplier of the fuel for billing purposes as specified in a fuel contract between these parties. This option is not allowed if an owner or operator and fuel supplier are the same party or are owned by common owners; or

(c) By conducting a "heat input" RATA, as defined in Section (8) below. Perform the RATA for each fuel flow system only during hours in which a single fuel is combusted. The accuracy of the fuel flow system must be less than or equal to 10.0%; or

(d) For oil fuel flowmeters, by comparing the total volume of fuel flow to tank measurements for a specified time period, as approved by the State regulatory agency. The time period for the comparative measurement must be long enough to reduce any error associated with the tank measurement technique used to an acceptable level. The tank measurement must correlate to one fuel flowmeter or one supply and one return flowmeter defined as a single "system." The accuracy of the fuel flowmeter in comparison to the tank measurement must be ±3.0%.

(8) Certification Test Requirements for Non-Part 75 Heat Input Systems

For any unit for which a non-Part 75 alternative method is used to determine heat input, an owner or operator must certify the heat input system as follows:

(a) Perform a concurrent RATA using a stack flow monitoring system and diluent reference analyzer and the heat input monitoring method at each of three different exhaust gas velocities, selected as follows:

1. Any frequently used low operating level between the minimum safe level and stable operating level at 50% load.

2. Any frequently used high operating level between stable operating level at 80% load and the maximum operating level. The maximum operating level should be equal to the faceplate capacity of the unit adjusted for any physical or regulatory limitations or other deratings.

3. Any operating level considered "normal" operating conditions. If the normal operating level is within a specified range (10% above the low level or 10% below the high level) then use a level that is evenly spaced between the low and high operating levels.

(b) Use the following methods from 40 CFR Part 60, Appendix A to perform concurrent tests comprising a heat input RATA.

1. For Flow, Method 2 (or 2A, 2B, 2C or 2D).

2. For CO_2 or O_2, Method 3 (or 3A).

3. For moisture, Method 4 (if applicable).

(c) Evaluate the combined relative accuracy of the heat input monitoring system as follows:

1. Use a DAHS to calculate heat input in mmBtu/hr using the flow and diluent CEMS and the heat input monitoring system using the formulas F-15, F-16, F-17, or F-18 of 40 CFR Part 75, Appendix F.

2. Determine the relative accuracy using the procedures in 40 CFR Part 75, Appendix A, Section 7.3.

3. If the relative accuracy of the heat input monitoring system is less than or equal to 10.0%, the monitoring system passes the relative accuracy test.

4. Perform a bias test on the relative accuracy test data using the procedures in 40 CFR Part 75, Appendix A, Section 7.6. If the bias test is failed, the owner or operator shall adjust each hour of measured data using the bias adjustment factor, as required for flow by 40 CFR Part 75, Appendix A, Section 7.6.5 and Appendix B, Section 2.3.3.

D. **DAHS Verification Requirements**

An owner or operator of a NO_x budget unit must complete DAHS verification testing for each system in the monitoring plan. This verification must demonstrate:

(1) That the software successfully generates an emissions report using records defined in the applicable EDR;

(2) That all formulas are correctly programmed; and

(3) That all necessary missing data procedures are correctly programmed.

E. **Certification Deadlines**

(1) **Existing Units**

Although an owner or operator must install, operate and report data from monitoring systems beginning on July 1, 1998, an owner or operator must successfully complete required certification testing for CEMS and flow systems before May 1, 1999. RATA testing completed prior to May 1, 1997 may not be used to meet the initial certification requirements of this program.

(2) **Existing Units in Long Term Shutdown on Participation Date**

An owner or operator of a unit in long term shutdown on May 1, 1999 must successfully complete required monitoring systems certification testing and DAHS verification testing requirements within 60 operating days of unit start-up.

(3) **New Units**

An owner or operator of a new unit that commences operation on or after May 1, 1999 must complete certification testing by the later of:

(a) The first day of the ozone season after the unit commences commercial operation; or

(b) The earlier of:

1. 45 unit operating days after the unit commences commercial operation; or

2. 180 calendar days after the unit commences commercial operation.

An AAR or AAAR of a new unit must report emissions data for each hour of operation on or after May 1, 1999 whether or not monitoring systems have been provisionally certified.

F. **Emissions Reporting Prior to Certification Test Completion and Certification Approvals**

For any period after the initial certification deadline (July 1, 1998 for non-CEMS systems and May 1, 1999 for CEMS systems) in which an owner or operator of any unit has not certified monitoring systems, an AAR or AAAR must report data using:

(1) Reference method testing; or

(2) Maximum potential values for heat input and for NO_x emission rate or stack flow and NO_x concentration for the unit.

When certification testing is successfully completed monitoring systems will be considered provisionally certified. An AAR or AAAR may report data from a provisionally certified monitoring system if the system has also met all applicable quality assurance requirements since the date of provisional certification. The data from a provisionally certified monitoring system are considered valid unless the State regulatory agency informs an AAR that the certification application has been disapproved.

G. **Certification Applications**

(1) **Certification Application Content**

This certification application must contain the following:

(a) Hardcopy test reports, including all data from the reference method or other testing, and supporting data for the reference method testing (i.e., reference method monitor calibrations).

(b) Electronic Data Report containing certification test data and monitoring plan data in the applicable electronic data reporting (EDR) format.

(c) DAHS verification, including documentation that the owner or operator has successfully completed all of the required DAHS verifications. An owner or operator should indicate when each required test was passed and should also indicate any tests that are not applicable to their particular unit or monitoring methodology.

(d) Certification Statements

(2) **Certification Application Submission Deadlines**

An AAR or AAAR must submit a certification application to the State regulatory agency within 45 days of completing certification testing.

IV. OPERATIONAL AND QUALITY ASSURANCE REQUIREMENTS

A. Development of QA/QC Plan

An owner or operator of any NO_x budget unit must develop and implement a quality control program for all of the monitoring systems and their associated components. At a minimum, an owner or operator must develop and maintain a written plan that describes step-by-step procedures and operations for each of the applicable quality assurance requirements in this Section. This plan must be retained on-site or at an alternative location known and accessible to the State regulatory agency if on-site storage is not feasible.

B. NO_x, CO_2, and O_2 CEMS QA Requirements

An owner or operator of a NO_x budget unit using a NO_x concentration or NO_x emission rate system, O_2 or CO_2 CEMS for heat input, or a moisture system must:

(1) Perform and report daily calibrations for each analyzer according to the requirements of 40 CFR Part 75, Appendices A and B and Sections C and D below.

(2) Perform and report a successful linearity test for each analyzer in accordance with 40 CFR Part 75, Appendix A, Section 6.2 once during each calendar quarter in which the unit operates more than 168 hours. At a minimum, one linearity test must be performed every calendar year that the unit operates. All linearity tests must be performed during unit operation.

(3) Perform and complete a relative accuracy test audit (RATA) in accordance with 40 CFR Part 75, Appendix A at least once every calendar year. Annual RATAs must be performed at least four months apart. The relative accuracy of the CEMS must be less than or equal to 20.0%.

(4) For each NO_x concentration or NO_x emission rate system relative accuracy test:

(a) If the relative accuracy is less than or equal to 10.0%, perform a bias test for all NO_x CEMS. Apply bias adjustment factors from the bias test to all measured emissions based on the requirements of 40 CFR Part 75, Appendix A, Section 7.6.5 and Appendix B, Section 2.3.3 beginning with the hour in which the last measurement of the RATA is recorded.

(b) If the relative accuracy is more than 10.0%, multiply the measurement for each hour by a factor of 1.1 beginning with the hour in which the last measurement of the RATA is recorded.

(c) If multiple or successive relative accuracy tests are performed to achieve improved CEMS performance, apply the applicable BAF or adjustment factor to the data based on the most recent test, until a subsequent test is completed.

C. **Additional High Analyzer Range Requirements**

For units with additional high NO_x or diluent analyzer ranges perform the tests described above as follows:

(1) Daily calibrations based on high or low scale span prior to reporting data at given range;

(2) Quarterly linearity checks for both high and low scale; and

(3) Periodic relative accuracy tests for "normal" operational range.

D. **Required Calibration Gases**

During the ozone season, perform all daily calibrations and linearity checks using protocol calibration gases. For tests performed during the non-ozone season an owner or operator must conform with applicable State requirements for calibration gas.

E. **Flow Monitoring System Requirements**

An owner or operator of a NO_x budget unit using a stack flow monitoring system must:

(1) Perform daily calibrations according to the requirements of 40 CFR Part 75, Appendices A and B.

(2) Perform daily interference checks according to the requirements of 40 CFR Part 75, Appendices A and B.

(3) Perform and complete a relative accuracy test audit (RATA) in accordance with 40 CFR Part 75, Appendix A, and a bias test at least once every calendar year. Annual RATAs must be performed at least four months apart. A three-load RATA is required, unless:

(a) The stack flow monitor is located on a peaking unit or bypass stack; or

(b) An owner or operator of the unit received State approval to perform a single-load RATA for initial certification and the owner or operator can demonstrate that the unit is operating at a constant load.

Apply bias adjustment factors from the bias test to all measured emissions based on the requirements of 40 CFR Part 75, Appendix A, Section 7.6.5 and Appendix B, Section 2.3.3 beginning with the hour in which the last measurement of the three-load RATA test (or normal load RATA, where applicable for peaking units and bypass stacks) is recorded.

If multiple or successive relative accuracy tests are performed to achieve improved monitoring system performance, apply the applicable BAF to the data for the most recent test, until a subsequent test is completed.

F. **QA Extensions for Missed Linearity Tests**

If an owner or operator fails to perform a linearity test in a quarter in which the unit operates for more than 168 hours, perform the test within 72 unit operating hours of the end of the quarter. A late test completed within this 72-hour grace period fulfills the linearity test requirement for the previous quarter, not the quarter in which it is performed.

G. **Moisture System Requirements**

For moisture systems comprised of dry and wet-basis oxygen analyzers perform the quality assurance tests required for O_2 systems in Section IV.B. For systems comprised of a moisture sensor, perform a daily calibration according to the manufacturer's recommended procedures. The sensor must meet a daily calibration specification of 6.0% based on span value. Also perform an annual relative accuracy test on the moisture system, as defined in Section III.C.(4) of this document.

H. **Quality Assurance Requirements for Fuel Flowmeters**

An owner or operator using fuel flowmeters to determine hourly heat input must perform a calibration of the fuel flowmeters the earlier of every two calendar years or every four unit operating quarters in which the fuel measured is combusted at the unit. Certified gas fuel flowmeters used for billing purposes as defined in Section II.C.(7)(b) are exempt from these calibration requirements.

Calibrate each fuel flowmeter using one of the following approaches:

(1) By removing the fuel flowmeter for calibration during the non-ozone season and meeting the requirements of 40 CFR Part 75, Appendix D, Sections 2.1.5.1. and 2.1.6 to demonstrate ±2.0% accuracy at the upper range value.

(2) By comparing the installed fuel flowmeter measurements to those of a calibrated reference fuel flowmeter as defined in 40 CFR Part 75, Appendix D, Section 2.1.5.2. to demonstrate ±2.0% accuracy at the upper range value.

(3) For oil fuel flowmeters, by comparing the total volume of fuel flow to tank measurements for the same time period. The time period for the comparative measurement must be long enough to reduce any error associated with the tank measurement technique used to an acceptable level. The tank measurement must correlate to one fuel flowmeter or one supply and one return flowmeter defined as a single "system." The accuracy of the fuel flowmeter system in comparison to the tank measurement must be ±3.0%.

(4) By conducting a "heat input" RATA, as defined in Section IV. The heat input RATA for each fuel type must be performed only during hours in which the single type of fuel is combusted. The accuracy of the fuel flow system (which may include multiple fuel flowmeters comprising a single system) must be less than or equal to 10.0%.

An owner or operator must retain documentation of each calibration and the calibration results on-site (or at an alternative location known and accessible to the State regulatory agency if on-site storage is not feasible).

I. Requirements for Unit-Specific NO_x Emission Rate

An owner or operator of a non-Part 75 unit that determines a unit-specific NO_x emission rate must retest the unit a minimum of once every five years to determine the maximum NO_x emission rate for the next five year period.

J. Requirements for Alternative Heat Input Methodologies

An owner or operator of a unit using an approved alternative heat input system must demonstrate that each major component of the monitoring system passes quality assurance standards approved in the petition. Unless otherwise provided in the system approval, these requirements should include the following specifications:

(1) Daily or periodic calibration tests or test comparable to CEMS daily calibrations required under 40 CFR Part 75.

(2) Quarterly linearity check or test comparable to linearity checks required under 40 CFR Part 75, Appendix B.

(3) Annual relative accuracy test as described above for initial certification.

If an owner or operator of a NO_x budget unit utilizes boiler efficiency testing as part of the method for determining heat input and the unit fails the periodic RATA, the boiler efficiency testing must be repeated before the periodic RATA test is repeated.

K. **Data Validity and Out-of-Control Periods**

(1) **CEMS Data Capture Requirements**

(a) **Full Operating Hours**

For any hour in which a unit operates (i.e., combusts fuel) during any part of all four quadrants of the hour, the continuous emission monitoring system must capture and record a minimum of one data point for each quadrant of the hour. Compute the hourly average from a minimum of four equally spaced data points during the hour.

(b) **Partial Operating Hours**

For any hour in which a unit does not combust fuel for one or more quadrants of the hour, an owner or operator must capture a minimum of one data point in each operating quadrant.

(c) **Hours in Which QA Activities are Performed**

For any hour in which quality assurance activities or other maintenance is occurring, an owner or operator may compute the hourly average from a minimum of two data points from different quadrants of the hour.

(2) **Quality Assurance Status**

(a) **Failed Quality Assurance Tests**

A monitoring system is considered out-of-control starting with the hour of the failure of any required quality assurance test. A test which is initiated and discontinued because the monitoring system is failing to meet the applicable performance specification or is otherwise found to be out-of-control is considered a failed test and the monitoring system is considered out-of-control starting with the hour in which the test was discontinued.

(b) **Missed Quality Assurance Tests**

A system is also out-of-control beginning in the first hour following the expiration of a previous test if the owner or operator fails to perform a required periodic test.

(c) **Determining In-control Status**

A system is considered in-control in the hour in which all tests which were failed or missed are successfully completed.

(3) **Data Reporting During Out-of-Control Hours**

During the period that the CEMS or monitoring system is out-of-control, not operating, or is otherwise determined, based on sound engineering judgment or for a known reason, to be producing inaccurate data, an owner or operator must do one of the following:

(a) Measure and report data from a backup monitoring system that has met all of the initial and ongoing quality assurance requirements of this rule.

(b) Measure and report data using a reference method monitoring system, as defined in the unit monitoring plan.

(c) Estimate and report data using the missing data procedures defined in Section VI of this document.

V. **RECERTIFICATION EVENTS AND PROCEDURES**

A. **Applicability of Recertification Requirements**

An owner or operator is subject to the recertification requirements in the following situations:

! Whenever an owner or operator makes a replacement, modification or change in the certified monitoring system (which includes the automated data acquisition and handling system) that significantly affects the ability of the system to measure or record the parameters used for calculating NO_x mass emissions.

  Examples of changes which require recertification include replacement of the analytical method including the analyzer, change in location or orientation of the sampling probe or site, rebuilding of the analyzer or all monitoring system equipment and replacement of an existing monitoring system.

! If an owner or operator has not operated and maintained a monitoring system for two calendar years.

! If an owner or operator replaces, modifies or changes the flue gas handling system or the unit operation resulting in significant changes to the flow or concentration profile, the monitoring system or component.

! Following a determination by the State regulatory agency that a replacement, modification or change in a monitoring system significantly affects the ability of the monitoring system to measure or record the parameters used for calculating NO_x mass emissions.

B. **Recertification Test Requirements**

(1) **Notification of Recertification Testing**

An AAR or AAAR must comply with applicable State notification requirements for recertification testing.

(2) **Tests Required**

For recertification testing, an owner or operator shall complete all of the tests required for initial certification, as described in Section III, unless otherwise approved by the State regulatory agency on a case-by-case basis, or in further written guidance.

C. **Impact of Recertification Event on Data Acceptability**

An owner or operator of a NO_x budget unit shall substitute missing data according to the standard missing data procedures during the period following the replacement, modification or change to the monitoring system up to the time of successful completion of all recertification testing except as provided below.

If a replacement, modification or change is such that the data collected by the previously certified monitoring system are no longer representative, such as after a change to the flue gas handling system or unit operation that requires changing the span value, an owner or operator must substitute data using initial missing data procedures. If a change results in a significantly higher concentration or flow rate, substitute maximum potential values as approved by the State regulatory agency during the period following the replacement, modification or change up to the hour of successful completion of all recertification testing.

VI. **NO_x BUDGET PROGRAM EMISSIONS REPORTING**

A. **General Reporting Requirements**

An AAR or AAAR of a NO_x budget unit must submit to EPA's Acid Rain Division electronic quarterly reports containing information on unit hourly operating status and emissions data, CEMS quality assurance activities, recertification and certification status and monitoring plan information beginning on July 1, 1998.

(1) **CEMS Units**

An AAR or AAAR of a NO_x budget unit using NO_x CEMS or stack flow monitoring, or heat input based on CEMS must submit an emissions report to EPA's Acid Rain Division each calendar quarter.

(2) **Non-CEMS Units**

An AAR or AAAR of a NO_x budget unit using fuel flow, default emission rates and non-CEM heat input methodologies to determine NO_x mass emissions must report hourly emissions and unit operating data twice each year: thirty days after the end of the June calendar quarter (including May - June) and thirty days after the end of the September calendar quarter (including July - September).

(3) **Submission Methods**

An AAR or AAAR must submit all quarterly reports to the EPA's National Computer Center mainframe computer electronically. An AAR or AAAR who does not have the capability to submit a quarterly report electronically may apply to the State regulatory agency for a hardship exception and submit quarterly reports on diskettes directly to the Acid Rain Division by mail. Detailed instructions and reporting formats are in the ***NO_x Budget Program Monitoring Certification and Reporting Instructions***.

B. **Data Processing Requirements/Data Editing**

All hourly data that is required to be recorded and reported on an hourly basis must be recorded electronically and should not be manually edited. This includes all

CEM data, hourly fuel flow data and data from alternative heat input methodologies that determine heat input on an hourly basis. It is permissible to record this data through different DAHS components (all of which should be identified in the monitoring plan) and to combine it at the end of the quarter. However, an owner or operator must provide State auditors real time access to this data. Other data, including sampling results, default rates, hourly load data, hourly operating status and long term fuel measurement data, may either be recorded electronically or entered manually into the DAHS. Calculations using the raw data and missing data substitution should be performed automatically by a DAHS component.

C. **Use of Diluent Cap for NO_x Emission Rate**

An owner or operator of a unit using diluent CEMS to determine NO_x emission rate may substitute maximum O_2 or minimum CO_2 diluent values to determine NO_x emission rate for any hour that meets the following conditions:

(1) For boilers that measure a CO_2 diluent value of less than 5.0% substitute a value of 5.0%;

(2) For boilers that measure an O_2 diluent value of more than 14.0% substitute a value of 14.0%;

(3) For turbines that measure a CO_2 diluent value of less than 1.0% substitute a value of 1.0%; or

(4) For turbines that measure an O_2 diluent value of more than 19.0% substitute a value of 19.0%.

D. **Data Reporting Requirements**

An AAR or AAAR must submit quarterly reports to the Acid Rain Division containing the following information, as defined in the applicable ***EDR***.

(1) **All Units**

- Monitoring Plan Information
- Certification and Recertification Information as Required by the NO_x Budget Program
- Cumulative Budget Period NO_x Mass Emissions (tons/budget period)
- Information Necessary for Missing Data Calculations including Availability and Hourly Load
- Hourly NO_x Mass Emissions (lbs)
- Hourly Operating Status

(2) **Units Using NO_x Concentration and Flow Monitoring**

- Hourly NO_x Concentration and Stack Flow Rate, identified by monitoring system/component IDs and formula IDs
- Span, NO_x Maximum Potential Concentration (MPC) and Maximum Potential Flowrate (MPF)
- Ongoing QA/QC Activities
- Initial Certification and Recertification Test Results

(3) **Units Using NO_x Emission Rate Systems (lb/mmBtu)**

! Hourly NO_x concentration (ppm) and Diluent Data identified by monitoring system/component IDs and formula IDs
! Hourly F-factor used to calculate NO_x emission rate
! Hourly NO_x emission rate, calculated by the DAHS
! Initial Certification and Recertification Test Results
! Ongoing QA/QC Activities
! Span, Maximum Emission Rate (MER)

(4) **Units using Part 75 Alternative Monitoring Systems to determine NO_x Rate (lb/mmBtu)**

! Hourly NO_x emission rate
! Other Information as defined and approved in petition

(5) **Units using Fuel Flowmeters and Part 75 Appendix E Heat Input/NO_x Correlation to Determine NO_x Emission Rate**

! Hourly Operating and Control Equipment Parameters
! Appendix E Curve Segment Definitions
! Hourly NO_x Emission Rate

(6) **Units Using Default NO_x Emission Rate Factor (lb/mmBtu) either Unit- specific or Unit Category**

! Hourly Control Equipment Parameters (if appropriate)
! Default Values

(7) **Units Using Stack Flow, F-factors and Diluent Monitoring to Determine Heat Input**

! Hourly Diluent and Stack Flow Rate, identified by monitoring system/component IDs and formula IDs
! Hourly F-factor Used to Calculate Heat input
! Hourly Heat Input (mmBtu/hr)
! Initial Certification and Recertification Test Results
! Ongoing QA/QC Activities
! Span and Maximum Emission Rate

(8) **Units using Hourly Fuel Flow Monitoring to determine Heat Input**

! Hourly Fuel Flow and Heat Input; identified by monitoring system ID
! Heat Content and Density of Fuel (if necessary)
! Maximum Fuel Flow
! Fuel Flowmeter Calibration Records

(9) **Units using Long Term Fuel Flow Monitoring or Fuel Measurements to determine Heat Input**

! Periodic Fuel Flow measurements
! Hourly Apportioned Fuel Flow and Heat Input

- Heat Content and Density of Fuel (if necessary)
- Maximum Fuel Flow
- Other Information as defined and approved in petition

(10) **Units using Hourly Alternative Heat Input Monitoring to determine Heat Input**

- Hourly Heat Input
- Other Information as defined and approved in petition

(11) **Units using Unit-Specific Maximum Heat Input**

- Default Value
- Other Information as defined and approved in petition

E. **Optional State Reporting**

As requested or approved by the responsible State regulatory agency, the quarterly emissions report may include additional electronic data demonstrating compliance or meeting reporting requirements for other applicable State programs. This information must be contained in standard record formats contained in the applicable EDR.

F. **Missing Data Procedures**

For each operating hour during the reporting period, an owner or operator of a NO_x budget unit must report NO_x mass emissions. For hours in which the data is missing or unacceptable, an owner or operator must use the following approaches to determine and report an appropriate value. This missing data substitution may be performed by the DAHS either at the end of each missing data episode or at the end of the reporting period.

(1) **Missing Data Procedures for NO_x Emission Rate and Stack Flow**

During any hour of missing data, an owner or operator of a unit using NO_x CEMS and heat input based on stack flow to calculate hourly NO_x mass emissions must either:

(a) Determine NO_x emission rate and flow rate using initial and standard missing data routines in 40 CFR Part 75, Subpart D, including the reporting and use of 2,160 operating hours of year-round emissions data for look-back purposes for any hour in which NO_x emission rate or stack flow data is missing or unacceptable; or

(b) Substitute the maximum potential NO_x emission rate (MER) and/or the maximum potential flow rate (MPF) as defined in 40 CFR Part 75.

(2) **Missing Data Procedures for NO_x Concentration Systems and Stack Flow**

An owner or operator of a NO_x budget unit using a NO_x concentration system and stack flow to calculate hourly NO_x mass emissions must either:

(a) Substitute and report a NO_x concentration and/or stack flow value using the load based missing data procedures found in 40 CFR Part 75, Subpart D including the reporting and use of 2,160 operating hours of year-round emissions data for look-back purposes for any hour in which NO_x emission rate or stack flow data is missing or unacceptable; or

(b) Substitute the maximum potential NO_x concentration and/or the maximum potential flow rate as defined in 40 CFR Part 75.

(3) **Missing Data Procedures for CO_2 or O_2 Used for Heat Input Calculations**

During any hour of missing data, an owner or operator of a NO_x budget unit using CO_2 or O_2 analyzers for heat input calculations must either :

(a) Substitute and report CO_2 and O_2 based on the amount of quality assured data, the length of the missing data period and the availability:

1. For the first 720 hours of quality assured monitor operating data, the average of the hour before and the hour after value for each hour of the missing data period.

2. If 720 hours of quality assured data have been obtained and the data availability is $\geq$ 90.0%, substitute the average of the hour before and hour after values for each hour of the missing data period.

3. If 720 hours of quality assured data have been obtained and the percent data availability is < 90.0%, substitute maximum % CO_2 or minimum % O_2 value, as defined in the monitoring plan, for each hour of the missing data period.

(b) Substitute and report the maximum % CO_2 or minimum % O_2 value as defined in the monitoring plan.

(4) **Missing Hourly Fuel Flow**

An owner or operator of a unit using fuel flow meter systems to estimate hourly heat input and/or NO_x emission rate using 40 CFR Part 75, Appendix E methodology must either:

(a) Use the missing data procedures in 40 CFR Part 75, Appendix D, Section 2.4, using as a look-back period or sampling period previously reported data for the ozone season only; or

(b) Substitute the maximum fuel flow rate and maximum NO_x emission rate to the unit or pipe, as submitted and documented in the monitoring plan.

(5) **Missing Fuel Flow Based on Long Term Fuel Flow**

An owner or operator of a unit using long term fuel flow measurements must either:

(a) Use the highest hourly fuel flow for any period during the previous three ozone seasons in which the unit operated; or

(b) Substitute the maximum hourly fuel flow to the unit approved as part of the heat input methodology petition or monitoring plan.

(6) **Missing Fuel Sampling Data**

For any hour in which gross calorific value or density is missing for a unit or pipe, an owner or operator must use the missing data procedures established in 40 CFR Part 75, Appendix D.

(7) **Missing Data for Alternative Heat Input Methodologies**

If the hourly heat input is missing because of missing stack flow, fuel flow, or sampling data, an owner or operator must use the missing data procedures for each of these parameters described in the appropriate sections above to substitute values prior to determining heat input.

If the hourly heat input is missing or unacceptable for other reasons, an owner or operator must either:

(a) Use the maximum hourly heat input for the unit, stack or pipe, approved as part of the heat input methodology petition; or

(b) Use the 40 CFR Part 75 based missing data procedures applicable to NO_x emission rate found in 40 CFR Part 75, Subpart D.

(8) **Missing NO_x Emission Rate Based on Appendix E**

For any hour in which the limits associated with unit or control system operating parameters required under 40 CFR Part 75, Appendix E are not met, an owner or operator must:

(a) If hourly heat input is available, substitute the generic default NO_x emission rate for the unit and calculate NO_x mass emissions using the measured hourly heat input and the default.

(b) For any hour in which monitored heat input is also not available, substitute the maximum NO_x mass emissions for the unit, based on the maximum hourly heat input and the generic default NO_x emission rate for the unit.

(9) **Missing Data for Hourly Moisture**

For any hour in which the moisture system value is not available or is unacceptable, an owner or operator must either:

(a) Substitute a moisture value of zero percent (0%); or

(b) Substitute the appropriate value based on the amount of quality assured data, and the moisture data availability, as follows:

1. Zero percent (0%) moisture for each hour of missing data if no prior quality assured data exist.
2. For the first 720 hours of quality assured monitor operating data, the average of the hour before and the hour after moisture value for each hour of the missing data period.
3. If 720 hours of quality assured data have been obtained and the moisture data availability is $\geq$ 90.0%, substitute the average of the hour before and hour after moisture values for each hour of the missing data period.
4. If 720 hours of quality assured data have been obtained and the percent data availability is < 90.0%, substitute zero percent (0%) moisture for each hour of the missing data period.

APPENDIX A: REFERENCE METHODS

Method	Reference	Date	Description	Parameter
Method 1	48 FR 45034	09/30/83	Reduction of Number of Traverse Points	Siting and sample traverses
	51 FR 20286	06/04/86	Alternative Procedure for Site Selection	
Method 1A	54 FR 12621	03/28/89	Traverse Points in Small Ducts	
Method 2			Velocity - S-type Pitot	Volumetric flow
Method 2A	48 FR 37592	08/18/83	Flow Rate in Small Ducts - Volume Meters	
Method 2C	54 FR 12621	03/28/89	Flow Rate in Small Ducts - Standard Pitot	
Method 2D	54 FR 12621	03/28/89	Flow Rate in Small Ducts - Rate Meters	
Method 3	55 FR 05211	02/14/90	Molecular Weight	O_2 and CO_2
Method 3A	51 FR 21164	06/11/86	Instrumental Method for CO_2 and O_2	
Method 3B	55 FR 05211	02/14/90	Orsat for Correction Factors and Excess CO_2 and O_2	
Method 4	48 FR 49458	10/25/83	Moisture Content	Moisture
Method 7	49 FR 26522	06/27/84	Nitrogen Oxide (NO_x)	NO_x
Method 7A	48 FR 55072	12/08/83	Ion Chromatographic NO_x Analysis	
Method 7C	49 FR 38232	09/27/84	Alkaline permanganate/ colorimetric for NO_x	
Method 7D	49 FR 38232	09/27/84	Alkaline Permanganate/ Ion Chromatographic for NO_x	
Method 7E	51 FR 21164	06/11/86	Instrumental Method for NO_x	
Method 19	44 FR 33580	06/11/79	SO_2 Removal and PM, SO_2, NO_x Rates from Electric Utility Steam Generators (F-Factor, Coal Sampling)	
Method 20	44 FR 52792	09/10/79	NO_x from Stationary Gas Turbines	NO_x and diluent emissions

APPENDIX B: SAMPLING AND ANALYSIS METHODS

SAMPLING:

For Flow Proportional Oil Sampling or Continuous Drip Oil Sampling:

ASME D4177-82 (Reapproved 1990), "Standard Practice for Automatic Sampling of Petroleum and Petroleum Products"

For Gas-fired Units or Oil-fired Units:

ASME D4057-88, "Standard Practice for Manual Sampling of Petroleum and Petroleum Products"

For Coal Units:

ASTM D2234-89, "Standard Test Method for Collection of a Gross Sample of Coal"

DENSITY OR SPECIFIC GRAVITY:

For Oil:

ASTM D287-82 (Reapproved 1991), "Standard Test Method for API Gravity of Crude Petroleum and Petroleum Products (Hydrometer Method)"

ASTM D941-88, "Standard Test Method for Density and Relative Density (Specific Gravity) of Liquids by Lipkin Bicapillary Pycnometer"

ASTM D1217-91, "Standard Test Method for Density and Relative Density (Specific Gravity) of Liquids by Bingham Pycnometer"

ASTM D1481-91, "Standard Test Method for Density and Relative Density (Specific Gravity) of Viscous Materials by Lipkin Bicapillary"

ASTM D1480-91, "Standard Test Method for Density and Relative Density (Specific Gravity) of Viscous Materials by Bingham Pycnometer"

ASTM D1298-85 (Reapproved 1990), "Standard Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method"

ASTM D4052-91, "Standard Test Method for Density and Relative Density of Liquids by Digital Density Meter"

HEAT CONTENT:

For Oil:

ASTM D240-87 (Reapproved 1991), "Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter"

ASTM D2382-88, "Standard Test Method for Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter (High-Precision Method)"

ASTM D2015-91, "Standard Test Method for Gross Calorific Value of Coal and Coke by the Adiabatic Bomb Calorimeter"

For Gaseous Fuels:
ASTM D1826-88, "Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter"

GENERAL ANALYSIS:

For Coal or Coke (Solid Fuels):
ASTM D3176-89, "Standard Practice for the Ultimate Analysis of Coal and Coke"

ASTM D2013-86, "Standard Method of Preparing Coal Samples for Analysis"

For Oil (Liquid Fuels):
ASTM D5291-92, "Standard Test Methods for Instrumental Determination of Carbon, Hydrogen, and Nitrogen in Petroleum Products and Lubricants"

For Gas (Gaseous Fuels):
ASTM D1945-91, "Standard Test Method for Analysis of Natural Gas by Gas Chromatography"

ASTM D1946-90, "Standard Practice for Analysis of Reformed Gas by Gas Chromatography"

GROSS CALORIFIC VALUE (GCV):

For Solid Fuels:
ASTM D2015-91, "Standard Test Method for Gross Calorific Value of Coal and Coke by the Adiabatic Bomb Calorimeter"

ASTM D1989-92, "Standard Test Method for Gross Calorific Value of Coal and Coke by Microprocessor Controlled Isoperibol Bomb Calorimeters"

ASTM D3286-91a, "Standard Test Method for Gross Calorific Value of Coal and Coke by the Isoperibol Bomb Calorimeter"

For Liquid Fuels:
ASTM D240-87 (Reapproved 1991), "Standard Test Method for Heat of Combustion of Liquid Hydrocarbon Fuels by Bomb Calorimeter:

ASTM D2382-88, "Standard Test Method for Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter (High Precision Method)"

For Gaseous Fuels:
ASTM D3588-91, "Standard Practice for Calculating Heat Value, Compressibility Factor, and Relative Density (Specific Gravity) of Gaseous Fuels"

ASTM D4891-89, "Standard Test Method for Heating Value of Gases in Natural Gas Range by Stoichiometric Combustion"

GPA Standard 2172-86, "Calculation of Gross Heating Value. Relative Density and Compressibility Factor for Natural Gas Mixtures from Compositional Analysis"

GPA Standard 2261-90, "Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography"

ASTM D1826-88, "Standard Test Method for Calorific (Heating) Value of Gases in Natural Gas Range by Continuous Recording Calorimeter"

APPENDIX C: FLOWMETER MEASUREMENTS

ASME MFC-3M-1989 with September 1990 Errata
"Measurements of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi"

ASME MFC-4M-1986 (Reaffirmed 1990)
"Measurement of Gas Flow by Turbine Meters"

ASME MFC-5M-1985
"Measurement of Liquid Flow in Closed Conduits Using Transit-Time Ultrasonic Flowmeters"

ASME MFC-6M-1987 with June 1987 Errata
"Measurement of Fluid Flow in Pipes Using Vortex Flow Meters"

ASME MFC-7M-1987 (Reaffirmed 1992)
"Measurement of Gas Flow by Means of Critical Flow Venturi Nozzles"

ASME MFC-9M-1988 with December 1989 Errata
"Measurement of Liquid Flow in Closed Conduits by Weighing Method"

ISO 8316 : 1987 (E)
"Measurement of Liquid Flow in Closed Conduits - Method by Collection of the Liquid in a Volumetric Tank"

American Gas Association Report No. 3: Orifice Metering of Natural Gas and Other Related Hydrocarbon Fluids. Part 1: General Equations and Uncertainty Guidelines (October 1990 Edition), Part 2: Specification and Installation Requirements February 1991 Edition) and Part 3: Natural Gas Applications (August 1992 Edition), excluding the modified calculation procedures of Part 3, as required by appendices D and E of Part 75.

EPA also may approve other procedures that use equipment traceable to NIST standards.

APPENDIX D: GLOSSARY

1998 New Unit: a budget unit which commences operation on or after July 1, 1998.

Add-on controls/Add-on NO_x controls/Add-on emission controls: a pollution reduction control technology that operates independent of the combustion process. This includes, but is not limited to selective catalytic reduction (SCR), selective non-catalytic reduction (SNCR), non-selective catalytic reduction (NSCR), flue gas recirculation (FGR) and water/steam injection.

Acid Rain Program: the national sulfur dioxide and nitrogen oxides air pollution control and emissions reduction program established in accordance with Title IV of the Clean Air Act, 40 CFR parts 72, 73, 75, 77 and 78 and regulations implementing Sections 407 and 410 of the Clean Air Act.

AIRS: Aerometric Information Retrieval System. EPA's mainframe data system to support Clean Air Act implementation.

Allowable methodologies: specific monitoring methodologies which are specified in State regulation and the ***Guidance For Implementation Of Emission Monitoring Requirements For The NO_x Budget Program*** as acceptable and are thus pre-approved; these include use of a CEMS, Part 75 Appendix E (where appropriate), Part 75 Appendix D (where appropriate), unit-specific default emission factors or generic default emission factors.

Alternative Authorized Account Representative (AAAR): the person who is authorized, in writing, to perform the duties of the Authorized Account Representative when necessary.

Alternative heat input methodology: any heat input methodology which is not specifically designated as an allowable methodology in the ***Guidance For Implementation Of Emission Monitoring Requirements For The NO_x Budget Program***. Any such methodology must be approved through petition of the regulatory agency prior to use.

Alternative monitoring systems/Part 75 alternative monitoring systems: a system or a component of a system designed to provide direct or indirect data of mass emissions per time period, pollutant concentrations, or volumetric flow. In order to be used for this program a owner or operator using the system must demonstrate that the system has the same precision, reliability, accessibility, and timeliness as the data provided by a certified CEMS or certified CEMS component in accordance with Subpart E of Part 75. In addition, before the system may be used to report data, it must be approved either by EPA for purposes of Part 75 or by the applicable regulatory agency for purposes of the NO_x Budget Program.

Appendix D: 40 CFR Part 75, Appendix D: Optional Emissions Data Protocol for Gas-Fired and Oil-Fired Units.

Appendix E: 40 CFR Part 75, Appendix E: Optional NO_x Emissions Estimation Protocol for Gas-Fired Peaking Units and Oil-Fired Peaking Units.

Appendix E NO_x System: the monitoring system comprised of DAHS software to apply NO_x/heat input correlation curve based on hourly heat input.

Authorized Account Representative (AAR): a responsible natural person who is authorized, in accordance with the appropriate regulations, to transfer or otherwise manage allowances for an account, as well as to certify any other reports to the NO_x Allowance Tracking System (NATS) and the NO_x Emissions Tracking System (NETS).

Automated data acquisition and handling system: that component of the CEMS or other emissions monitoring system approved by the State regulatory agency for use in the NO_x Budget Program, designed to interpret and convert individual output signals from NO_x concentration monitors, flow monitors, diluent gas monitors, and other component parts of the monitoring system to produce a record of the measured parameters in the measurement units required by the NO_x Budget Program. This component must be capable of reporting data in the required format and of substituting values according to approved algorithms when monitored data is unavailable.

Bias: systematic error, resulting in measurements that will be either consistently low or high relative to the reference value.

BAF: Bias Adjustment Factor, as calculated per 40 CFR Part 75, Appendix A, Section 7.6.5. To be applied to hourly emissions data if a monitoring system fails to meet the bias test requirement.

Boiler: an enclosed fossil or other fuel-fired combustion device used to produce heat and to transfer heat to recirculating water, steam, or any other medium.

Budget period: the period beginning May 1 of each year and ending on September 30 of the same year, inclusive.

Budget unit/NO_x budget unit: any unit subject to the NO_x Budget Program.

Bypass stack: any duct, stack, or conduit through which emissions from a budget unit may or do pass to the atmosphere, which either augments or substitutes for the principal stack exhaust system or ductwork during any portion of the unit's operation.

Calibration error: the difference between (1) the response of gaseous monitor to a calibration gas and the known concentration of the calibration gas; and/or (2) the response of a flow monitor to a reference signal and the known value of the reference signal.

Calibration MPF: the maximum potential flow rate expressed in calibration units. This value is not calculated for differential pressure (DP) type meters.

Calibration Units: the actual units of measure used in daily calibration testing for flow monitors (sfpm, ksfpm, scfm, kscfm, scfh, kscfh, acfm, kacfm, acfh, kacfh, inH_2O, mmscfh, mmacfh, afpm, kafpm).

Capacity factor: (1) the ratio of a unit's actual annual electric output (expressed in Mwe-hr) to the unit's nameplate capacity times 8,760 hours, or (2) the ratio of a unit's annual heat input (in million British thermal units or equivalent units of measure) to the unit's maximum design heat input (in million British thermal units per hour or equivalent units of measure) times 8,760 hours.

CEM: Continuous Emission Monitor

CO_2 or O_2 System: the monitoring system used to measure CO_2 or O_2 for the calculation of hourly heat input, if an analyzer other than the diluent component of a NO_x emission rate system is used.

Common pipe: a pipe which supplies fuel to more than one unit.

Common stack: a stack from which the emissions from two or more units pass to the atmosphere.

Continuous Emission Monitoring System (CEMS): the equipment required by this guidance to sample, analyze, measure, and provide, by in-stack readings taken at least once every 15 minutes, a permanent record of emissions, expressed in pounds per million British thermal units (lb/mmBtu) and pounds per hour.

Control equipment: see Add-on Control Equipment.

DAHS: Data Acquisition and Handling System

Diluent analyzer: that component of the NO_x emission rate system which senses the concentration of oxygen or carbon dioxide or other diluent gas as applicable, and generates a signal output which is a function of a concentration of that diluent gas.

Diluent gas: a major gaseous constituent in a gaseous pollutant mixture, which in the case of emissions from fossil fuel-fired units are carbon dioxide and oxygen.

EDR/Electronic Data Reporting: the process by which budget units periodically report information on unit hourly operating status and emissions data. Reports must be submitted in electronic format to EPA's Acid Rain Division.

Electronic data reporting (EDR) format: the file reporting format required for the submission of periodic NO_x Budget Program monitoring data reports.

EPA: U.S. Environmental Protection Agency

Flow monitor: that component of the continuous emission monitoring system which continuously measures and records the volumetric flow of exhaust gas.

Flow System: the monitoring system used to measure hourly stack flow to calculate heat input or NO_x mass emissions and comprised of, at a minimum, a flow monitor and DAHS software.

Fossil fuel: natural gas, petroleum, coal or any form of solid, liquid or gaseous fuel derived wholly, or in part, from such material.

Fossil-fuel fired: the combustion of fossil fuel or any derivative of fossil fuel alone, or, if in combination with any other fuel, fossil fuel comprises 51% or greater of the annual heat input on a Btu basis.

Full-Scale Range: the largest value that a particular scale on the instrument is capable of measuring. It is a result of the design and construction (and subsequent modification) of the monitor itself.

Gas System: the monitoring system used to measure calculate heat input comprised of, at a minimum, a gas fuel flow meter and DAHS software.

GCV/Gross Calorific Value: heat value of the fuel combusted.

Heat input: the product (expressed in mmBtu/time) of the gross calorific value of the fuel and the fuel feed rate into the combustion device (expressed in mass of fuel/time); does not include the heat derived from preheated combustion air, recirculated flue gas, or exhaust from other sources.

Heat Input System: the monitoring system used to calculate heat input based on approved alternative heat input methodologies, boiler efficiency testing, periodic solid fuel measurements, and comprised of DAHS software and any other components required in an approved petition.

Hour before and after (HB/HA): for purposes of the missing data substitution procedures of this regulation, the quality-assured hourly NO_x concentration, CO_2 concentration, hourly flow rate, or hourly NO_x emission rate recorded by a certified monitoring system during the unit operating hour immediately before and the unit operating hour immediately after a missing data period.

Indirect Heat Exchanger: combustion equipment in which the flame and/or products of combustion are separated from any contact with the principal material in the process by metallic or refractory walls, which includes, but is not limited to, steam boilers, vaporizers, melting pots, heat exchangers, column reboilers, fractioning column feed preheaters, reactor feed preheaters, fuel-fired reactors such as steam hydrocarbon reformer heaters and pyrolisis heaters.

Main stack: the principal stack exhaust system through which emissions from a budget unit may or do pass to the atmosphere.

Maximum Potential Flow (MPF): the maximum potential flow rate in standard cubic feet per hour (scfh), wet basis. It is used for missing data purposes.

Maximum potential NO_x emission rate: the emission rate of nitrogen oxides (in lb/mmBtu) calculated in accordance with Part 75, Appendix F, Section 3, using the maximum potential nitrogen oxides concentration as defined in Part 75, Appendix A, Section 2 and either the maximum oxygen concentration (in % O_2) or the minimum carbon dioxide concentration (in % CO_2) under all operating conditions of the unit except for unit start-up, shutdown, and upsets.

Maximum Potential Velocity (MPV): the maximum stack gas velocity for a given unit or stack. It can be determined either through velocity traverse testing or a formula calculation. It is expressed in units of standard feet per minute (sfpm), wet basis.

Maximum rated heat input capacity/maximum heat input capacity: the maximum steady state heat input under which a unit may be operated as determined by its physical design and characteristics. Maximum heat input capacity is expressed in millions of British Thermal Units (mmBtu) per unit of time.

Missing data period: the total number of consecutive hours during which any component part of a certified monitoring system or approved alternative monitoring system is not providing quality-assured data, regardless of the reason.

Missing data procedures: procedures used to provide data during periods in which any of the components needed for operation of the budget unit's approved monitoring methodology are unable to provide data. For Part 75 units, these procedures are specified in Part 1, Section V.C of the ***Guidance For Implementation Of Emission Monitoring Requirements For The NO_x Budget Program*** and 40 CFR Part 75, Subpart D. For non-Part 75 units, procedures are specified in Part 2, Section VI.F of the Guidance.

Moisture system: the monitoring system used to measure hourly moisture for the calculation of hourly heat input, NO_x emission rate or NO_x mass emissions, if an hourly moisture adjustment is required. A moisture system may include a moisture sensor and DAHS software or one or more dry and wet basis oxygen analyzers and DAHS software.

Monitoring methodology: any methodology used to monitor, estimate and record NO_x emission rate, NO_x mass emissions, or heat input for a budget unit.

Monitoring plan: a document compiled, submitted and maintained by the owner or operator of a budget unit which documents the methodologies used to measure and report NO_x emissions and heat input.

Monitoring system: a collection of equipment and any associated components used to monitor or estimate and to report NO_x emission rate, stack flow, fuel flow, moisture or heat input.

Multiple Stack: a stack associated with a unit which emits or is capable of emitting to more than one stack.

NADB: National Allowance Data Base; the data base established under Section 402(4)(C) of the Clean Air Act.

Nameplate capacity: the maximum electrical generating output (expressed in Mwe) that a generator can sustain over a specified period of time when not restricted by seasonal or other deratings, as listed in the NADB under the data field "NAMECAP" if the generator is listed in the NADB or as measured in accordance with the United States Department of Energy standards if the generator is not listed in the NADB.

NIST traceable reference material (NTRM): a calibration gas mixture tested by and certified by the National Institutes of Standards and Technologies (NIST) to have a certain specified concentration of gases. NTRMs may have different concentrations from those of standard reference materials.

Non-Part 75 units: any budget unit not subject to the requirements for emission monitoring adopted pursuant to Section 412 of the Clean Air Act Amendments of 1990 and codified at 40 CFR Part 75.

NO_x: Nitrogen oxides

NO_x Budget Program: the regional nitrogen oxides air pollution control and emissions reduction program established in accordance with the Ozone Transport Commission Memorandum of Understanding.

NO_x emission rate system: a system to determine NO_x emission rate, comprised of a NO_x concentration monitor, diluent monitor and DAHS software.

NO_x concentration: NO_x emissions measured in parts per million (ppm).

NO_x concentration system: the monitoring system used to determine NO_x concentration, comprised of a NO_x concentration monitor and DAHS software. This system is used in conjunction with a separately certified flow system to calculate NO_x mass emissions.

NO_x default rate system: the monitoring system used to report hourly NO_x emission rate for the NO_x Budget Program based on default emission rates. It is comprised of DAHS software.

NO_x emission rate: a value expressed in terms of NO_x mass emissions per unit of heat input (lb/mmBtu).

NO_x mass emissions (hourly or budget period): a value expressed in terms of NO_x mass emissions per unit of time (lb/hr or tons/budget period).

NO_x Part 75 Alternative Monitoring System (AMS): the monitoring system comprised of components defined in petition approved as meeting the requirements of Subpart E of Part 75.

OILM System: the monitoring system used to calculate heat input used to measure and comprised of, at a minimum, a mass of oil fuel flow meter and DAHS software.

OILV System: the monitoring system used to record hourly volumetric oil flow rate, comprised of, at a minimum, a volumetric oil fuel flow meter and DAHS software.

Owner or Operator: any person who owns a budget unit or who operates, controls or supervises a budget unit; this includes, but is not limited to, any holding company, utility system or plant manager.

Ozone season: the period beginning May 1 of each year and ending on September 30 of the same year, inclusive.

Part 60: 40 CFR Part 60.

Part 60 unit: any budget unit subject to the continuous emissions monitoring requirements of 40 CFR Part 60.

Part 75 unit: any budget unit subject to the requirements for emission monitoring adopted pursuant to Section 412 of the Clean Air Act Amendments of 1990 and codified at 40 CFR, Part 75.

Peaking unit: as defined in 40 CFR Part 72.2, dated May 17, 1995. Peaking unit means a unit that has: (1) an average capacity factor of no more than 10.0 percent during the previous three calendar years and (2) a capacity factor of no more than 20.0 percent in each of those calendar years. For purposes of part 75 of this chapter, a unit may initially qualify as a peaking unit under the following circumstances: (1) if the designated representative provides capacity factor data for the unit for the three calendar years immediately prior to submission of the monitoring plan and if the unit's capacity factor is projected to change on or before the certification deadline for NO_x monitoring in § 75.4 of this chapter, the designated representative submits a demonstration satisfactory to the Administrator that the unit will qualify as a peaking unit under the first sentence of this definition using the three calendar years beginning with the year of the certification deadline for NO_x monitoring in § 75.4 of this chapter (either 1995 or 1996) as the three year period; or (2) if the unit does not have capacity factor data for any one or more of the three calendar years immediately prior to submission of the monitoring plan, the designated representative submits (a) any capacity factor data, beginning with the unit's first calendar year of commercial operation following the first year of the three calendar years immediately prior to the certification deadline for NO_x monitoring in § 75.4 of this chapter (either 1992 or 1993), (b) capacity factor information for the unit for any remaining future period needed to provide capacity factor data for three consecutive calendar years, and (c) a demonstration satisfactory to the Administrator that the unit will qualify as a peaking unit under the first sentence of this definition using the three consecutive calendar years specified in (2)(a) and (b) as the three calendar year period.

Protocol gas: a calibration gas mixture prepared and analyzed according to Section 2 of the EPA Traceability for assay and Certification of Gaseous Calibration Standards (revised September 1993), EPA 6000 R93/224 or a revised version of this standard approved by both EPA and the State.

QA/QC/Quality Assurance/Quality Control: the process of determining and assuring the accuracy and quality value of emissions data produced by any given monitoring system.

RA: See Relative Accuracy

Range: the extent of values that a continuous emission monitoring component is capable of measuring. Specifications for determining range are found in Appendix A to Part 75 and in Part 2, Section III.B of this document.

RATA/Relative Accuracy Test Audit: a test designed to determine the relative accuracy of a monitoring system. See 40 CFR Part 75, Appendix A, Section 7.4.3.

Reference method: any direct test method of sampling and analyzing for NO_x or flow as specified in Part 60, Appendix B.

Reference value/reference signal: the known concentration of a calibration gas, the known value of an electronic calibration signal, or the known value of any other measurement standard approved by the State regulatory agency, assumed to be the true value for the pollutant or diluent concentration or volumetric flow being measured.

Relative accuracy: a statistic designed to provide a measure of the systematic and random errors associated with data from continuous emission monitoring systems, and is expressed as the absolute mean difference between the NO_x concentration, NO_x emission rate or volumetric flow measured by the NO_x concentration, NO_x emission rate system or flow monitor and the value determined by the applicable reference method(s) plus the 2.5 percent error confidence coefficient of a series of tests divided by the mean of the reference method tests in accordance with Part 75.

Span: the extent of values that a continuous emission monitoring component is required to be capable of measuring. See Part 2, Section III.B.

Stack flow: the volumetric flow of exhaust gas passing through the stack.

Standard reference material: a calibration gas mixture issued and certified by NIST as having specific known chemical or physical property values.

Start-up: that period of time during which the equipment is heated to operating temperature from a cold or ambient temperature.

Submitted: sent to the appropriate authority under the signature of the Authorized Account Representative. For purposes of determining when something is submitted, an official U.S. Postal Service postmark or electronic time stamp shall establish the date of submittal.

Substitute data: emissions or volumetric flow data provided to assure 100 percent recording and reporting of emissions when all or part of the continuous emission monitoring system is not functional or is operating outside applicable performance specifications.

Turbine: a machine which converts energy stored in a fluid into mechanical energy by channeling the fluid through a system of stationary and moving vanes.

Unit: any fossil-fuel fired combustion device.

Unit operating hour: any hour (or fraction of an hour) during which a unit combusts any fuel.

Volumetric flow: the rate of movement of a specified volume of gas past a cross-sectional area (e.g., standard cubic feet per hour).